

NETWORK WORLD

The Newsweekly of User Networking Strategies

Volume 7, Number 50

An International Data Group Publication

December 10, 1990

Router firms to support SDLC traffic

By Paul Desmond
Senior Editor

Wellfleet Communications, Inc. and Cisco Systems, Inc. will soon add support for IBM's SDLC protocol to their bridge/routers, making it easier for users to construct multiprotocol backbone networks.

Wellfleet, Cisco Systems and other bridge/router vendors already support numerous local-area network protocols, enabling customers to consolidate LAN traffic onto a common backbone.

But IBM Systems Network Architecture nets have traditionally required their own backbones because bridges and routers do not support SNA's Synchronous Data Link Control protocol. With SDLC support, users will be able to merge parallel networks into multiprotocol backbones.

Users of Cisco Systems' AGS router told *Network World* that the firm has revealed plans to support SDLC in the first quarter of next year. The company confirmed that it is working on SDLC support, although it declined to provide details other than to say it would make an announcement around the end of January.

Wellfleet, based here, said it will announce early next month a new Transparent Synchronous (continued on page 57)



PHOTO ©1990 SPIDER MARTIN

Boeing Computer Support Services' Philip Hewitt

Multiprotocol backbone is giant step for NASA's LANs

By Paul Desmond
Senior Editor

HUNTSVILLE, Ala. — Boeing Computer Support Services has built a nationwide backbone for the National Aeronautics and Space Administration that supports five protocols and eliminates the need for redundant parallel nets.

NASA's Program Support Communications Network Internet (PSCNI) is meeting NASA requirements to let users on different local-area networks communicate with other LANs nationwide and to contain costs by eliminating the need to string point-to-point links between sites.

The high-speed PSCNI backbone connects all 17 NASA loca-

tions nationwide plus space agencies in Canada, Europe and Japan.

The network is based on Cisco Systems, Inc. routers and uses bandwidth from NASA's Program Support Communications Network, a T-1 backbone that supports NASA's voice, data and video requirements.

"I see PSCNI as the first step toward universal connectivity among the various NASA centers and programs," said Dan Scott, NASA's PSCN systems engineering branch chief.

The need for PSCNI began taking shape in early 1988, when Boeing Computer Support Services was receiving numerous requests from NASA installations (continued on page 59)

AT&T chases NCR as open systems mate

Carrier pursues computer maker to bolster data networking and transaction processing strategies.

By Bob Brown
Senior Editor

NEW YORK — AT&T last week made a \$6.12 billion hostile takeover bid for NCR Corp. in an effort to create the world's leading provider of networked computing products and services.

AT&T's proposal, which observers said amounted to an admission by the carrier that its own seven-year foray into the computer business has failed, was seen as a possible boon to network users seeking the convenience of one-stop shopping for network services and computers.

In a week filled with proposals

Network managers react to acquisition news, page 60.

and rejections, NCR's board of directors as of press time had spurned AT&T's proposed stock-for-stock swap valued at \$90 per NCR share but said it would negotiate if AT&T were to offer \$125 per share. AT&T instead went to NCR's stockholders with a \$90 per-share cash tender.

Despite harsh exchanges between AT&T Chairman Robert Allen and NCR Chairman Charles Exley, analysts said the fact that NCR even mentioned a price suggests the deal will take place.

AT&T has proposed merging its money-losing Computer Systems Business into NCR, integrating computing along with network products and services. AT&T's Allen said he covets NCR's strong presence in transaction processing-oriented industries such as retail and finance.

"We're not trying to be a gen- (continued on page 60)

ALLIGATORS IN THE SWAMP

See page 61.

Alligators gobble E-mail project: Tale of an IBM-to-DEC fiasco

MCI unveils X.400-based EDI service

By Maureen Molloy
Staff Writer

WASHINGTON, D.C. — MCI Communications Corp. last week announced MCI EDI 400, a service that will enable users to exchange documents over the carrier's public X.400 mail network.

The service, unveiled here at the Electronic Data Interchange Association Conference, joins a growing list of offerings from a range of vendors (see feature, this page).

MCI EDI 400 will enable users to transmit EDI documents to trading partners over MCI Mail, rather than building private EDI networks, and integrate EDI files along with E-mail and other data. Users can transmit and receive EDI files and E-mail messages (continued on page 58)

NETLINE



PACBELL WINS TITLE as first BOC to offer tariffed Primary Rate Interface. Page 2.

LAN VENDORS TO OFFER multiprocessing software to unlock the potential of super-servers. Page 2.

GIVING IN TO PRESSURE, Nynex lets bypass providers collocate gear at its central offices. Page 2.

UNISYS CTOS TOOLS extend system control. Page 6.

IEEE GIVES metropolitan-area net specification its seal of approval. Page 6.

DEC ADDS TCP/IP Telnet support to DECserver 300. Page 6.

SWITCHING FROM A PBX to Centrex saves user time and money. Page 38.

FEATURE



Sought-for EDI revolution is still mainly evolution

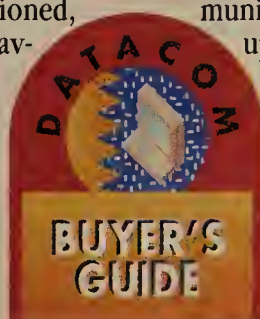
By Mark Langner
Special to Network World

When electronic data interchange was first envisioned, it was ballyhooed as having the potential to revolutionize the way business is done. This is still true today, although the revolution is taking longer than many enthusiastic EDI users had anticipated.

EDI is defined as the computer-to-computer transfer of business data between trading part-

ners in a standardized format. This transfer can be on a direct basis, with two companies communicating using an agreed-upon data protocol. Or more likely, it will involve a user signing up with an EDI network service to communicate with several companies.

In practice, EDI enables users to transmit documents such as purchase orders, price quotes and even payments to custom- (continued on page 41)



PacBell delivers PRI service to users on a limited basis

Central office in LA and in San Francisco get ISDN service; 15 more could follow by the end of 1991.

By Bob Wallace
Senior Editor

SAN FRANCISCO — Pacific Bell last week became the first Bell operating company to provide a tariffed ISDN Primary Rate Interface (PRI) service.

Pacific Bell filed its Integrated Services Digital Network PRI tariff last month and has begun offering the service, dubbed PRI Integrated System (PRI IS), from one central office here and a second in downtown Los Angeles. The company may offer PRI through as many as 15 additional central offices in major metropolitan areas by the end of 1991, based on user demand.

Local exchange carrier PRI

services enable users to make more efficient use of local access facilities and flexibly access a wide variety of switched local calling services such as 800 numbers and WATS.

Pacific Bell's PRI IS is sold in a 23B+D configuration in which the PRI link supports 23 64K bit/sec traffic-bearing B channels and a 24th 64K bit/sec D channel for signaling and packetized data transmission. That D channel can support additional PRI links configured with 24 B channels.

Users pay a \$1,500 onetime installation charge and \$545 a month per PRI link.

Pacific Bell offers PRI IS with
(continued on page 60)

LAN vendors mount drive to support multiprocessing

New NOS versions would benefit superservers.

By Tom Smith
Senior Writer

Leading network operating system vendors are taking steps to address the lack of multiprocessing software that has hampered early superserver users from taking full advantage of their new servers' power.

Users need network operating systems that support multiprocessing in order to process CPU-intensive client/server applications more efficiently than current network software programs do.

However, while AT&T, Compaq Computer Corp. and NetFRAME Systems, Inc. are shipping multiprocessor servers

today, only Banyan Systems, Inc. has delivered an operating system that supports multiprocessing. The lack of multiprocessing software has forced some users to order single-processor versions of the superservers or use only a fraction of the capacity of high-end models.

Microsoft Corp., however, will introduce a multiprocessing version of its OS/2 LAN Manager by the first quarter of 1991, according to Drew Freeman, associate product manager for LAN Manager products.

The Redmond, Wash., vendor is working on an asymmetric multiprocessing version of LAN
(continued on page 7)

Nynex agrees to collocate alternative carriers' gear

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Pressured by state regulators after four years of negotiations with alternative access carriers, Nynex Corp. last week said it will allow bypass providers to collocate equipment at its central offices.

The agreement will enable alternative carriers to pick up traffic from any central office in a city and carry it to local buildings via their fiber-optic networks or route it to an interexchange carrier. Customers stand to benefit from the backup and disaster recovery services provided by the new independent local-loop facil-

ities. Although a tariff spelling out the details and pricing has not been filed, Nynex will allow alternative carriers in New York Telephone Co. and New England Telephone and Telegraph Co. service areas to place a range of termination equipment — such as multiplexers and channel banks — in its central offices.

Alternative access carriers hailed the agreement as a landmark that could set a precedent for similar agreements in other states.

Alternative carriers will have access to central offices for maintenance and inspection of their
(continued on page 59)

Briefs

Rockwell Int'l picks US Sprint. Rockwell International Corp. last week signed a three- to five-year agreement with US Sprint Communications Co. under which the carrier will serve as the systems integrator for a \$35 million network upgrade. US Sprint will act as the prime contractor in the building of a network that will combine its own service offerings, Northern Telecom, Inc. DMS-250 switches and an Ameritech network management control center. The net will link Rockwell's divisions and subsidiaries nationwide.

Amtrak gets on board with AT&T. National Railroad Passenger Corp. last week said it has awarded AT&T contracts worth more than \$4 million to install 10 Definity Communications Systems supporting Amtrak terminals along the Washington, D.C.-to-New York corridor and at three administrative sites. Amtrak will use Integrated Services Digital Network service between all 10 private branch exchanges to speed call processing.

Amtrak will use the Call Vectoring and Look-Ahead Interflow features on the Definity Generic 2 systems being installed at its Washington, D.C. headquarters. These features enable companies with multiple agent groups or locations to handle customer calls more efficiently. Installation, which has already begun, should be completed this month.

AT&T to cut packet service rates. AT&T last week filed a revised tariff for its Accunet Packet Service (APS) that features lower rates. If approved, the tariff would take effect Jan. 19. AT&T plans to reduce rates for APS by 10% and cut by 25% the rates for its Domestic Internetworking Service (DIS) feature that enables APS to hand off traffic to a local exchange carrier's packet service.

APS business day charges of 75 cents for each 1,000 packets would be reduced to 69 cents, while non-business day charges would go from 38 cents to 35 cents per 1,000 packets. AT&T also plans to reduce from \$1.60 to \$1.20 the DIS charge for passing 1,000 packets and from \$3.15 to \$2 the charge for routing 1,000 packets between packet services.

In another move, the carrier filed to introduce a volume discount plan. The proposed volume discounts range from 5% for users spending between \$5,000 and \$8,000 monthly to 25% for those spending more than \$100,000 per month. AT&T

also plans to introduce a fixed-rate monthly network connection charge for users signing five-year contracts that range from \$450 a month for a 2,400 bit/sec digital connection to \$900 a month for a digital 56K bit/sec link. The carrier said it also wants to create a flat-rate installation fee of \$500. Current installation fees range from \$300 to \$1,000.

Under the proposed tariff, the monthly charge to connect to the network digitally at 2,400 bit/sec would rise from \$150 to \$500 a month, while the charge for a digital 56K bit/sec connection to the net would decrease from \$1,225 to \$1,000. An analog 2,400 bit/sec link to the net would rise from \$290 to \$500, while an analog 9.6K bit/sec network connection would go down from \$880 to \$800.

PacBell inks ISDN Centrex pact. Pacific Bell last week announced its largest Integrated Services Digital Network Centrex contract to date, a multiyear agreement with Jet Propulsion Laboratory (JPL) of Pasadena, Calif. Under the contract, Pacific Bell will upgrade over the next two years 1,000 analog Centrex lines at JPL's La Canada and Altadena, Calif., sites to support the ISDN Basic Rate Interface. Bob Iverson, telecommunications manager for JPL, said the company will eventually replace many of its 13,000 analog Centrex lines with Centrex Integrated Systems service as older customer premises equipment is phased out. JPL plans to use the ISDN service for coaxial-cable elimination and personal computer-to-local-area network applications.

Hackers may have hit NASA phones. National Aeronautics and Space Administration Johnson Space Center officials last week said they have yet to determine whether hackers gained access to the private branch exchange at the agency's Houston headquarters to place unauthorized long-distance calls. But in a prepared statement, Space Center officials denied a *Houston Chronicle* article that said hackers had bilked the agency out of \$12 million worth of long-distance calls over the past two years. NASA refuted the report, saying its long-distance bill only totals \$3 million a year.

NASA is investigating possible fraudulent use of its long-haul services. "Our phone bill has not increased markedly over the last two years, but we are not sure whether or not hackers have been able to use our [long-haul service]," a spokesman said.

CONTENTS

Industry Update

AT&T reclaims job of Pro WATS billing. 9
Cabletron releases LANtern net analyzer for its MMAC. 9

Telecommunications

Tariff 15 deal gets FCC nod but too late. 13
Virtual bypass lets users tap unused T-1 bandwidth. 13

Data Communications

Vendors mull access to switched services. 17

Local Networking

IEEE panel resolves glitch with bridging. 21
UB to unveil OS/2 net control for Access/One hub. 21

Management Strategies

IS managers at S&Ls facing budget woes. 23

International

Radio giant 'bridges' international network centers. 27
Issues stand to sidetrack international net projects. 27

Products & Services

Firm unveils option to LAN superservers. 31
Zenith links E-net nodes to broadband. 31

Opinions

Long hours, little thanks is just part of the job. 34
What AT&T's computer bid means to users. 34
How to remake networks in the user's image. 35

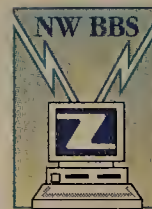
Action Center

Networking

Marketplace

Networking Careers

Resource Directory



NW Bulletin Board

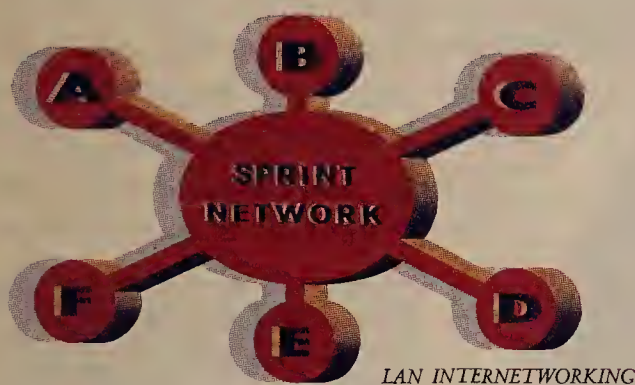
Contact us electronically. Our BBS lets you submit letters to the editor, pass on tips and leave change of address requests. It is also a forum for interaction with other readers.

Use your IBM, Apple or other microcomputer to reach the BBS at 300 to 2,400 bit/sec (8N1) by dialing 508-620-1160, or 508-620-1175, or at speeds up to 9.6K bit/sec by dialing 508-620-1178. You can also reach us in person by calling 800-622-1108.

Article reprints (minimum 500 copies) can be obtained from Donna Kirkey, Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9171; (508) 875-6400.

AVPN IS A TERRIBLE THING TO WASTE.

IF YOU'RE ONE OF OUR MULTI-LOCATION CUSTOMERS, chances are you have our VPNsm service. There's also a good chance you're



only using a fraction of its real potential.

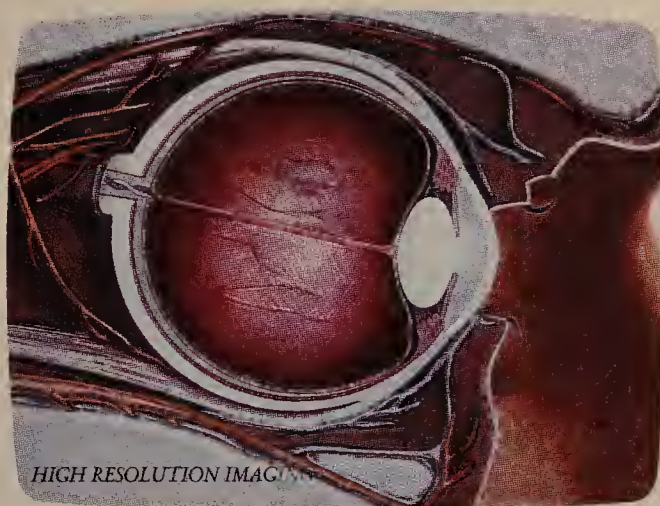
Of course, VPN is the ideal medium for a whole spectrum of high-end applications. Because it handles

data as routinely as voice. And operates nationwide. As well as throughout

Canada, the U.K., and Hong Kong.

And now, you can choose the digital access you need: T1 Partitioning or ISDN PRI. Plus LEC 56 in selected areas. Which opens up a whole new world of possibilities.

For example, you can send high-



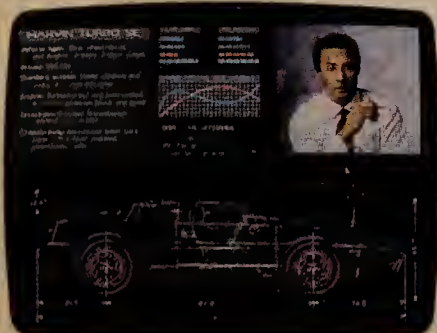
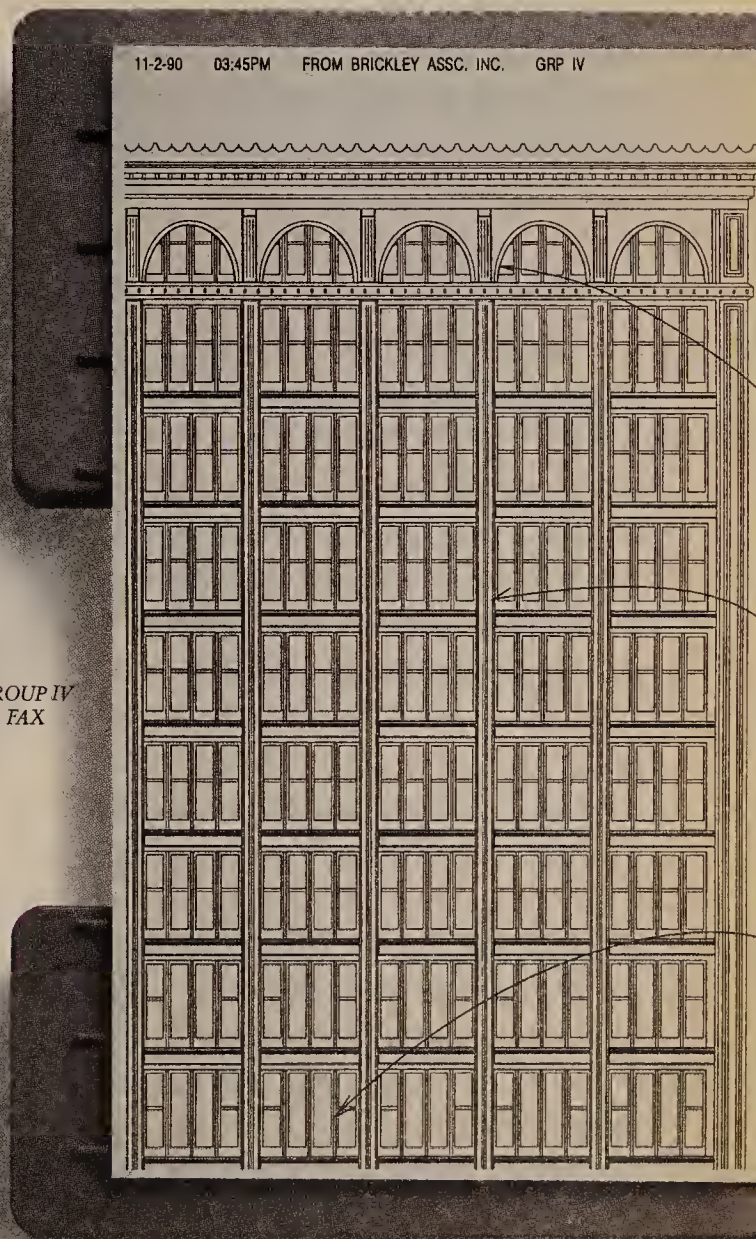
resolution images that are accurate enough to verify circuit board designs. And fax the whole image for the price of a 12-second phone call. Or bundle circuits for high-bandwidth applications like interactive CAD/CAM.

You can also transfer huge files between LAN networks in high-speed

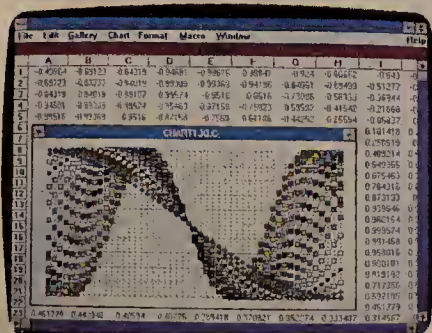
bursts. And with the VPN/Meeting Channel Gatewaysm you can get the ultimate in video flexibility. Over 800 locations for full motion video in over 25 countries. You can even bring smaller sites on-line cost-effectively, at 112 Kbps.

If you'd like to know more, just ask

your Sprint account team. Or call us at 1-800-877-1918. We'll have full information in your fax machine in only a few



ISDN/VPN INTERNETWORKING



BULK FILE TRANSFER



INTERACTIVE CAD/CAM

minutes. And show you how to take advantage of VPN's full potential.

Because we think a VPN is a terrible thing to waste. Almost as much as the competitive edge it can give you.

US Sprint.
IT'S A NEW WORLDSM
© 1990 US Sprint Communications Company Limited Partnership

IBM lets the Now 486 technology

Without the proper venue, dazzling ability often falls short of expectations. That's certainly been the case with the Intel 486™ microprocessor, a processor that hasn't been utilized to its full potential. So that's what IBM set out to do. Just as it takes a seasoned jockey to turn a thoroughbred into a champion, it took IBM to give the 486 processor every opportunity to work its genius. Introducing IBM Personal System/2® Model 90 XP 486 and Model 95 XP 486.

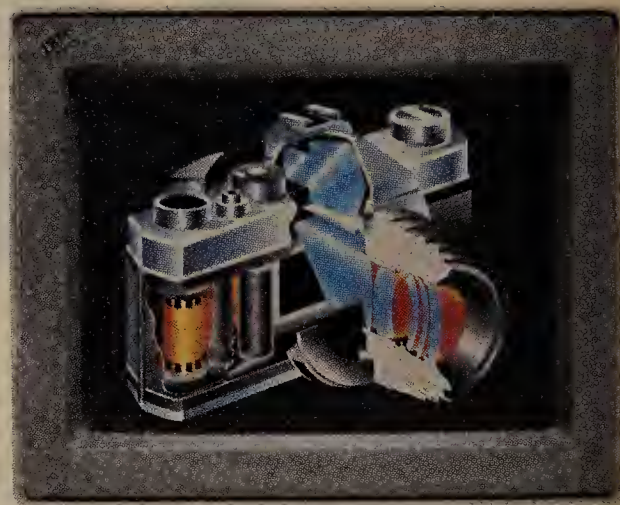
From speed and storage capacity to graphics capabilities and upgradability, the new PS/2® Models 90 and 95 are designed to optimize the power of the Intel 486 processor and deliver a truly balanced performance—equipping you with solutions for today, and providing a platform of growth for tomorrow.

THE 90'S ARE A POWERFUL BREED.

Right out of the starting gate, the Models 90 and 95 will astound you with their power and sophistication. Featuring a 33 MHz processor and a 25 MHz processor that's easily upgraded to 33 MHz, they deliver blazing speed and balanced performance, expanding your capacity for computer-intensive applications like CAD/CAM, financial modeling and multimedia. The course between your data and your processing has also been strengthened—the Micro Channel™ 32-bit data path, combined with a lightning-quick data-transfer rate, not only optimizes the present power of the 486 processor by feeding it a steady stream of information, but also provides for processor

enhancements and will allow you to benefit from advanced operating systems to come. Plus these other innovations: a wider 64-bit data path which optimizes the 486 processor's access to system memory; 4MB memory standard

(expandable to 32MB); and a 256KB cache option for even greater speed. All in all, it's easy to see how the concept of computer "power" has been enhanced, and how IBM helps you take full advantage of every second of computing time.



BRILLIANCE ON DISPLAY.

With increased power comes increased capabilities—the most visually stunning of which is Extended Graphics Array (XGA), standard on the PS/2 Models 90 and 95, and the heart of IBM's spectacular new display presentation.

With high resolution (1,024 x 768 pels) and execution that's significantly faster than VGA, XGA's sharper, clearer picture, coupled with the IBM 8515 color display, gives you swifter performance in windowed environments, and provides graphics-intensive applications such as desktop



horses run. realizes its full potential.

publishing, image processing and engineering design with a stunning new look.

FAST TIMES ARE IN STORE.

To satisfy even the most demanding storage needs, from LAN systems to data base management to numeric-intensive applications like financial analysis and modeling, IBM has one of the most advanced solutions available. IBM's super-fast SCSI hard disks are pure state-of-the-art performers. With additional hardfile expansion bays, the

PS/2 Models 90 and 95 have enormous storage potential—up to .96 gigabytes on the Model 90 and up to 1.6GB on the Model 95. And with the PS/2 External Storage Enclosures, the Models 90 and 95 can provide 8.96GB and more. We've also augmented the computing power by adding more flexibility to resident memory—our new 1.3 version of OS/2® requires as little as 2MB on your system. With this streamlined

version you not only get more room for applications, but some users will experience a substantial performance increase in system functions as well. So when you need to make great strides with your computing power, you can count on IBM to give you terrific storage capability wherever you may need it.

DESIGNED TO KEEP YOU OUT IN FRONT.

For the turns and hurdles ahead, you'll need technology that has foresight built in. Through a unique design, the Expandable Processor (XP) allows for an architected family of upgradable processor enhancements that can extend the life



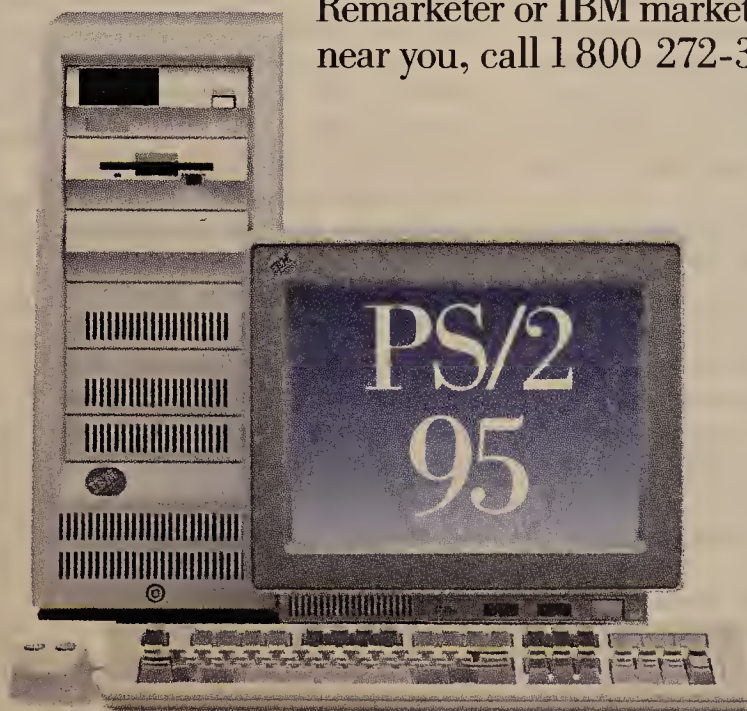
Features	IBM PS/2 Model 90	IBM PS/2 Model 95
Microprocessor		
Standard	80486	80486
Clock speed	25-33 MHz	25-33 MHz
Optional upgrade	33 MHz	33 MHz
Memory		
Standard	4MB (70ns)	4MB (70ns)
Maximum	32MB	32MB
Integrated Functions	Extended Graphics Array (XGA) and display port, DMA serial port (dual ports on Model 90), DMA parallel port, pointing device port, keyboard port, diskette controller support for three drives, SCSI Adapter with Cache.	
Fixed Disk Storage		
Standard	80-320MB	160MB-320MB
Display Modes	XGA (includes all VGA modes) 640 x 480 x 256 colors/ 64 gray shades; 1024 x 768 x 16 colors/gray shades; hardware support for 132 column text mode; 16-bit direct color mode at 640 x 480 x 64K colors	
Available Expansion Slots	three 32-bit	six 32-bit
Bus Architecture		
Data path	MCA 32-bit	MCA 32-bit

of your system. With Micro Channel busmaster adapters, you can incorporate multiple processors—like adding “computers” to your computer. And coupled with the industry-standard Small Computer System Interface (SCSI), you'll be able to support new applications and continue to build on your system as your needs become more varied and complex.

With optimized performance in balance, power, speed and adaptability, the new PS/2 Models 90 and 95 are designed to keep you ahead of the pack. To find out more about the new leader in 486 computing, contact your IBM Authorized Remarketer or IBM marketing representative. For a remarketer near you, call 1 800 272-3438.

How're you
going to do it?
PS/2 it!

IBM



Unisys to offer centralized mgmt. of remote CTOS nets

Software lets users fix net problems remotely.

By Jim Brown
Senior Editor

SAN JOSE, Calif. — Unisys Corp. is scheduled this week to announce software that will enable central-site personnel to monitor and control remote networks supporting Unisys workstations running the CTOS operating system.

Called CTOS InControl, the package enables users to monitor remote hardware, network software or applications for problems, which can then be corrected from a central CTOS-based workstation.

The software was developed with the help of TSB Bank PLC in London, which has \$100 million worth of CTOS-based products. The bank was looking for a way to centrally manage its CTOS products in order to eliminate the need to keep trained personnel at each remote site, said Bruce Halvorsen, Unisys' manager of communications and training.

"As users begin putting mission-critical applications on remote workstations instead of mainframes, we're finding the ability to manage the workstations and install software from a central site is becoming a major requirement," Halvorsen said.

A second release of CTOS InControl due out next year will run

under IBM's mainframe-based NetView network management system and enable a NetView operator to monitor and control remote CTOS workstations. Unisys said it is also working on software that will enable NetView to monitor and control remote Unisys 2200 or A-Series mainframes but declined to say when it will ship.

Four components

CTOS InControl has four software components. The first, Local Event Management (LEM), is a client/server application.

The client portion runs on CTOS workstations attached to a Unisys Cluster Local-Area Network and passes alarms to a CTOS workstation running the LEM server when problems such as a disk drive failure or software glitch occur. It also informs the server when end users change the configuration by adding applications or peripherals.

Users can instruct the LEM server to pass only certain alarms via Open Systems Interconnection, IBM Systems Network Architecture, Unisys' Distributed Communications Architecture or X.25 nets to a central-site CTOS workstation running the second component, Integrated Event Monitor software.

The central-site workstation

displays the alarms on-screen and stores them in an Oracle Corp. data base management system for future reference.

The operator can use the third component, Remote Access Facility (RAF), running on the centralized CTOS workstation, to see if the failed hardware can be bypassed in order to get the remote workstation working. RAF will also enable the central-site operator to remotely debug software problems to get applications running again.

Alarms not forwarded to the central site can be displayed on the CTOS workstation running LEM server.

The last component, Software Distribution, runs on the central-site CTOS workstation and enables users to download software upgrades to remote CTOS workstations.

With close to 800,000 CTOS workstations installed, the software could play an important part in putting Unisys at the forefront of remote system management, said Kevin O'Neill, vice-president of network research and consulting at Business Research Group, a market research firm in Newton, Mass.

Available now, CTOS InControl components vary in price depending on which CTOS workstation is used. Pricing ranges from \$1,200 to \$2,400 for an LEM server that includes a license for up to 128 clients, from \$14,000 to \$28,000 for the Integrated Event Monitor, from \$600 to \$1,000 for RAF and from \$600 to \$900 for Software Distribution. □

DEC to offer Telnet on DECservers

By Jim Brown
Senior Editor

LITTLETON, Mass. — Broadening its support for open systems, Digital Equipment Corp. last week said it is building support for the TCP/IP Telnet virtual terminal protocol into its DECserver 300 terminal servers.

Telnet support will enable asynchronous terminals or microcomputers emulating asynchronous terminals linked to a DECserver 300 to establish a session over an Ethernet with a local host supporting Telnet, or access remote Telnet hosts via an Internet Protocol router.

Previously, DECserver 300-attached terminals were restricted to using DEC's Local Area Transport (LAT) protocol to access a local DEC VAX via Ethernet. Alternatively, terminal users could log on to a local VAX and use

DECnet to communicate with a remote VAX.

DEC said its next generation of terminal servers — which are now in development and will replace the DECserver 300s — will support LAT, Telnet and the Open Systems Interconnection's Virtual Terminal Protocol. DEC is also considering whether it should build its OSI-based DECnet Phase V software directly into terminal servers. Currently, terminal servers do not support DECnet.

"This falls under our strategy to provide multivendor interoperability," said Lee Cooper, DEC's local-area network access marketing manager. "Users are not going to be locked into having to log on to a LAT-based machine anymore."

The DECserver 300 connects as many as 16 local terminals to an Ethernet. Each terminal communicates asynchronously to the DECserver 300 at 19.2K bit/sec. The DECserver 300 will then use LAT or Transmission Control Protocol/Internet Protocol to packetize asynchronous data and route it via Ethernet to the target host.

(continued on page 57)

IBM moves unit overseas to tighten ties to Europe

By Paul Desmond
Senior Editor

LONDON — IBM last week announced it will move the headquarters of its Communication Systems unit from Somers, N.Y., to a site outside Heathrow Airport here.

Communication Systems' network product development will continue at locations throughout Europe and the U.S., but top officials of the unit's market support, finance and planning organization will move here by the third quarter of next year.

IBM hopes the move will enable it to work more closely with European users — an increasingly large contingent of IBM's customers — as well as U.S. users with global networks.

Users on both sides of the Atlantic reacted positively to the announcement.

"The ability of communications vendors to provide services in a global environment is a key

issue," said Gary Weis, senior vice-president of networking and technology in the data communications department of Sears Technology Services, Inc. "IBM and other companies are positioning themselves to [respond] to global requirements as opposed to being perceived as U.S.-only companies."

Analysts speculated that another reason for IBM's move was to get closer to the front lines of Open Systems Interconnection activity.

"They said, 'Let's do something reasonably dramatic and get close to the hotbed of OSI in the world,'" said Dixon Doll, chairman of DMW Group, Inc., a consultancy in Ann Arbor, Mich.

Ellen Hancock, an IBM vice-president and general manager of the Communication Systems division, said demand for all networking products — not just OSI tools — is growing in Europe and (continued on page 58)

IEEE's MAN spec to bolster public packet net services

By Bob Wallace
Senior Editor

NEW YORK — The Institute of Electrical and Electronics Engineers, Inc. last week approved a proposed metropolitan-area network specification as a U.S. standard — a move that's expected to pave the way for high-speed public packet-switched data services.

The IEEE 802.6 Metropolitan Area Network Standard is the culmination of eight years of work by the IEEE's 802.6 Committee. Telephone companies are expected to build networks adhering to the standard as foundations for high-speed packet-switched offerings such as Switched Multimegabit Data Service (SMDS).

The standard has strong support across the industry, including such backers as Bell Communications Research, the seven regional Bell holding companies and their equipment suppliers, Hewlett-Packard Co. and IBM. Local-area network bridge and router vendors such as Cisco Systems, Inc., 3Com Corp. and Vitalink Communications Corp also

support the standard.

"The big-picture importance of this standard is that the industry now has a solid base on which to build SMDS services," said James Mollenauer, chairman of the 802.6 Committee and vice-president of advanced development at Artel Communications Corp., a Hudson, Mass.-based vendor of fiber-optic transmission systems.

"Companies wanted an established standard rather than building on what we thought the standard might be," he added.

The first major service to be introduced over carriers' metropolitan-area networks will be SMDS, the first publicly available broadband service. SMDS is designed to be an on-demand, high-bandwidth service supporting speeds ranging from 1.544M to 150M bit/sec and higher.

SMDS will be ideal for bursty data applications, including the interconnection of geographically dispersed local-area networks, and will eventually support applications such as video and imaging.

The standard specifies a packet-switched, dual counterrotating ring architecture that uses the Distributed Queue Dual Bus protocol for media access control.

The two rings each transmit data in only one direction. If one ring fails, the other handles packet transmission.

Users applauded the ratification of the specification but stressed they will not spend heavily on prototype products.

"We're not going to invest in SMDS products until multiple manufacturers build interchangeable equipment and interfaces to this standard," said William Yundt, director of networking and communication systems for Stanford University.

"What isn't covered is almost as important as what was defined," Yundt said. "The standard does not specify network management and billing interfaces."

IEEE 802 Committee Chairman Don Loughry, standards manager for HP, said the 802.6 Committee will work to broaden the metropolitan net standard to address such areas as a network management interface, T-1, T-3 and SONET interfaces and isochronous service.

Isochronous service would require that cell relay switches be (continued on page 58)

Correction: In the article "A good network is like money in the bank" (NW, Nov. 26), the parent company of First National Bank of Maryland was incorrectly identified. The actual name of the parent company is First Maryland Bancorp.

In addition, the bank's network traffic is 1.28 million minutes per month, rather than per year, as was noted in the article.

And finally, the IBM 3084 host in Millsboro, used for check processing and daily bank operations, was actually a 3083; the 3090 in Baltimore was actually a 3033.

The article "Momentum unveils XIPC tools for net applications" (NW, Dec. 3) incorrectly listed the company's phone number. Momentum Software Corp. can be reached at (800) 767-1462.

Hughes' new PES VSAT line offers range of models

Low-end version makes VSATs more affordable.

By Bob Brown
Senior Editor

FRAMINGHAM, Mass. — Hughes Network Systems, Inc. today will unveil its Personal Earth Station (PES) VSAT line, which includes models ranging from compact, low-cost units designed for remote locations to larger versions for sites with heavy traffic requirements.

Hughes is banking that the low-end models — which cost 40% to 50% less than standardized very small aperture terminals, will attract customers that previously couldn't afford VSATs.

Chevron Corp. said it has already made a major commitment to the new VSATs and is planning to use them to replace terrestrial links currently supporting service stations and other sites.

Hughes' strategy is to move from a single VSAT offering to a series of VSATs designed to meet customers' individual needs better, said Paul Gaske, vice-president of Hughes' VSAT Marketing Group, in an interview here.

The PES line ranges from the company's high-end flagship PES 8000 VSAT to the PES 4000, which supports data and video broadcast-only transmissions.

The high-end PES 8000 comes with 1- to 1.8-meter antennas that support two-way transmissions. It receives data at rates of

512K or 128K bit/sec and transmits at 128K or 64K bit/sec.

The mid-range PES 6000 uses .75- or 1-meter antennas designed to support interactive communications at remote sites that do not require the full functionality of a PES 8000 VSAT. The PES 6000s receive traffic from the hub at up to 128K bit/sec and transmit at rates up to 64K bit/sec.

The PES 6000 is a completely remodeled VSAT that breaks away from the traditional concave disk shape in favor of a curved rectangular unit. It is optimal for low-rate, data-only applications such as automated teller machines, point-of-sale and credit verification needs, and process control and monitoring.

The PES 6000 "is for those customers that can afford to give up some functionality in favor of better economics," Gaske said.

To operate the PES 6000 on a 1,000-node net costs about \$250 per site per month, whereas the PES 8000 costs between \$350 and \$450 a month per site.

The PES 4000 uses .75- to 1.8-meter antennas that only support broadcast transmissions at rates of 128K and 512K bit/sec. It costs about \$150 per site monthly in a 400-site network.

The VSATs can be mixed and matched in the same net and will

be available in March, said Carol Politi, marketing specialist at Hughes Network Systems.

Chevron has contracted to buy a minimum of 4,000 PES VSATs to be installed at service stations, oil refineries and other corporate sites, said Greg Lee, manager of customized network services at Chevron. The VSAT net is expected to save the company about \$20 million over five years, he said.

Chevron has hired Hughes to manage the network hub in San Ramon, Calif., Lee said. Chevron is using the VSATs to support credit card transactions and a debit card pilot at its service stations but will expand the network to support other parts of the business, Lee said.

LAN bridge

Hughes also said it will offer for the first time a local-area network bridge for its PES 8000 VSATs, enabling users to link geographically separate Ethernet or token-ring LANs via satellite.

The card is being developed by the vendor's Hughes LAN Systems subsidiary. It will reside in the PES 8000's indoor unit and have built-in Simple Network Management Protocol agents that can be managed under Hughes' IllumiNet centralized net management system. Hughes plans to monitor and control the LAN bridge as well as LAN traffic sent via satellite, Politi said.

An Ethernet interface is expected to be available in June and a token-ring card should be available in the fall. Pricing for the bridging modules is not available. **Z**

Open Token Foundation work languishes in limbo

By Bob Brown
Senior Editor

SANTA CLARA, Calif. — The Open Token Foundation (OTF), which burst onto the scene two years ago to promote interoperability of token-ring products, has virtually ceased operations, *Network World* has learned.

OTF's inability to sign on token-ring market leader IBM made it difficult to attract as many members as it originally sought, OTF members said. As a result, the foundation could not generate the membership dues needed to establish an interoperability testing lab.

OTF is not collecting membership dues for 1991, nor is it accepting new memberships or planning any activities, said Steve Bell, OTF treasurer and manager of the LAN Business Development Group at National Semiconductor Corp.

Bell described OTF as "dormant, not dead," however.

OTF, however, has declared success in its mission to convince users that IBM is not the only ven-

dor of IEEE 802.5 token-ring products and that products from multiple vendors can interoperate, Bell said.

He cited the group's NetWorld '89 interoperability demonstration, which featured token-ring products from IBM and 17 other vendors, as a highlight of the group's efforts.

"We showed interoperability not to be the Goliath of a problem everyone first thought it would be," Bell said. "Oddly enough, that somewhat lessened interest in the group."

OTF will remain inactive until a "driving issue that everyone can rally around" brings the group back into action, Bell said.

He acknowledged that failure to win IBM's support was a critical problem.

"If we had IBM as a member, OTF would probably be a very thriving group," Bell said. "That's something we failed on, and it was pivotal."

Harry Saal, president and chief executive officer of Network General Corp., a former OTF

member company, concurred.

"The whole organization was crippled by IBM not joining. IBM continued to establish its own application software interfaces and protocols without involving the rest of the industry," Saal said.

Colin Mick, OTF's executive director while at LanQuest Group, which served as OTF's administrative headquarters, said OTF was put on hold during the summer because most of its members were preoccupied with a token-ring technical problem linked to Texas Instruments, Inc.'s 16M bit/sec token-ring chipset. The problem pointed out what some members felt was one of OTF's major shortcomings — its failure to establish an interoperability lab.

If OTF had established such a testing facility from the start, the problem might have been nipped in the bud, Saal said.

Users were disappointed with the news.

"It's really a shame," said Cheryl Currid, director of applied information technology for Coca-Cola Co. Foods Division in Houston. "You just know something will come up with the next revision of the chipset or with interoperability issues, and there would be a need for a forum." **Z**

EDI users tell VAN reps: Here's how you can help

By Maureen Molloy
Staff Writer

WASHINGTON, D.C. — Electronic data interchange users met with representatives from 15 value-added network (VAN) providers last week to tell them how they can help users implement or expand their EDI programs.

Gathering at a session of the

The EDI users also voiced a need for simplified pricing structures.

▲▲▲

Electronic Data Interchange Association (EDIA) Conference here, users said they wanted VANs to offer more links to other vendors' networks and provide better assistance in getting trading partners to use EDI. The users also voiced a need for simplified pricing structures and more transparent tracking capabilities for users of multiple nets.

In order for them to fully capitalize on EDI, users said VANs need to provide seamless net-

work connections with other carriers, allowing users to communicate with as many trading partners as possible. But some argued that VANs have slowed this effort by offering free service to large users that require trading partners to use the same net.

"The hub company tells its suppliers they must do EDI and that they must do it on a particular network, which, in the long run, will significantly slow the widespread adoption of EDI," said John Goetzman, customer service manager with Harbinger* EDI Services, Inc., an EDI software and value-added network provider in Atlanta. "Open networks are crucial if EDI technology is to be used to its fullest advantage."

All the vendors, however, insist they support open links to other VANs.

"Naturally, we'd love all of our hub customers' trading partners to use our network, but we know that's not realistic," said Peggy Wolf, product manager of BT Tymnet, Inc. "We support open network systems and have adopted a no-cost gateway policy to make interconnects easier for the user."

Since adding EDI trading partners is key to benefiting from the

(continued on page 59)

Vendors drive to multiprocessing

continued from page 2

Manager that it developed along with Compaq to run on the latter's SystemPro server.

Although less powerful than a symmetric multiprocessing implementation such as VINES, asymmetric LAN Manager will still provide significant performance and capacity improvements, Freeman said. Tests performed by Microsoft indicate that its multiprocessing implementation will allow users to support 50% more users per server and provide as much as 30% better response time than standard versions of the software.

Asymmetric multiprocessing preassigns specific tasks, such as file I/O or network requests, to one processor, while another might be dedicated to application processing. With symmetric multiprocessing, by contrast, every processor is available to perform every task on a first come, first served basis.

"We're looking at symmetric multiprocessing in the future," Freeman said. "This is our first pass at it."

Freeman declined to specify when Microsoft will announce multiprocessing support in LAN Manager. He did say, however, that the company will offer an ad-

aptation kit for LAN Manager OEMs, which will be able to modify source code to run on specific vendors' multiprocessing servers.

Microsoft expects the product to draw interest from users that are nearing capacity on their existing servers and running CPU-intensive applications such as data bases, Freeman said.

"At this point, all of our bigger accounts have expressed interest in it," he said.

Texaco sold on VINES

Banyan, meanwhile, reported brisk sales of its VINES SMP product, underscoring user interest in the technology. According to Dana Rasmussen, product manager for VINES SMP, the company sold 100 copies of the operating system by the beginning of November, about one month after it began shipping the offering.

VINES SMP will enable users to support as many as 300 LAN nodes per server, Rasmussen said, compared to a typical maximum of 150 nodes with a uniprocessor version of VINES.

Texaco U.S.A.-Gas Department in Houston is running VINES SMP on two multiprocessing SystemPro servers today, with plans to increase that number to seven, according to Thomas Thomason, beta-test coordina-

(continued on page 58)



The Ultimate Connection.

How many computer trade shows offer you the ultimate opportunity to connect with hundreds of four-star exhibitors showcasing the latest products, programs and services?

And how many provide a Seminar Program with a direct connection to the best in the industry eager to assist with all your networking and connectivity needs?

Only one. NetWorld 91. The Ultimate Connection.

**NetWorld Boston
Hynes Convention Center
February 12-14, 1991**

For information on advance registration call today.

800-444-3976

NetWorld is produced by Bruno Blenheim Inc., trade show management, Englewood Cliffs, NJ • 201-569-8542

NetWorld Expositions in the U.S.A. are owned, produced and managed by Bruno Blenheim Inc.
NetWorld is a servicemark of Novell, Inc. licensed exclusively in the U.S.A. to Bruno Blenheim Inc.

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

“**M**icrosoft [Corp.]’s shift in LAN Manager distribution is having a negative impact on [3Com Corp.] server and 3+Open sales. 3Com’s Workgroup Systems sales, which include 3+Open, declined 36% from the fourth quarter [of last fiscal year] to the first quarter [of this year].”

According to a report from Wessels, Arnold & Henderson Minneapolis

People & Positions

Newbridge Networks, Inc. last week announced the appointment of **Peter Sommerer** as chief operating officer, a position he has held in an acting capacity since the office was created six months ago. Sommerer joined Newbridge in 1987 as director of product management for the 3624 MainStreet Intelligent T-1 Channel Bank and the 2600 MainStreet series of Integrated Services Digital Network interfaces.

Gerard Callanan last week was named Western area director of sales for **Auspex Systems, Inc.**, a Santa Clara, Calif., maker of superservers for Unix-based workstations. Callanan will oversee sales and systems engineering in 13 Western states, and he will be responsible for sales and support. He had been regional director of the Irvine, Calif., area for Data General Corp.

Jon Slater has been named vice-president and general manager of **GTE Telecom**, a **GTE Corp.** business unit that provides communications networks and systems for large customers. Slater will be responsible for GTE Telecom’s Systems Integration and Network Management and Control units. □

Cabletron releases LANtern net analyzer for its MMAC

Module gives users snapshot of network trouble.

By Bob Brown
Senior Editor

ROCHESTER, N.H. — Cabletron Systems, Inc. last week said it will market a network analyzer module for its Multi Media Access Center (MMAC) intelligent wiring hub that is based on Novell, Inc.’s LANtern network monitor.

Cabletron’s new LANtern Network Monitoring Module will enable network managers to take a snapshot of network traffic at a node where a network problem exists and determine the root of the failure by examining network-layer protocol data collected by the module.

The LANtern Network Monitoring Module is designed to run in tandem with Cabletron’s Remote LANView or Spectrum net management software, enabling a user to issue LANtern commands from a central net management workstation.

The strategy to integrate LANtern into the MMAC hub is consistent with Cabletron’s effort to simplify LAN management by bringing more capabilities into the wiring closet, said Michael Welts, Cabletron’s marketing manager. Cabletron, like some of its competitors, has integrated routing and terminal server technology into its intelligent hubs in a modular fashion, he said.

The LANtern module is based

on the Novell LANalyzer Products Division’s LANtern product, a rack-mountable chassis running software that monitors remote Ethernet performance and collects usage statistics (“Novell division to develop, sell LAN diagnostic gear,” *NW*, Jan. 29). Its support for the Simple Network Management Protocol lets the module pass this data on to a central-site net management system.

Cabletron began offering its own remote LAN monitoring device, the LANView Network Analyzer, earlier this year but chose to integrate Novell’s LANtern into the MMAC hub for several reasons, Welts said.

Cabletron chose LANtern because Novell has a staff dedicated to network analyzers, whereas Cabletron would have had to form a project team to build a net analyzer module, he said. Cabletron will continue to sell the LANView Network Analyzer, a portable device some users may prefer.

Welts said the agreement is also significant in that it gives Cabletron a chance “to get on-board with Novell,” the industry’s leading network operating system vendor. Cabletron began talking to Novell about the agreement in August.

The LANtern module is priced at \$3,995 and is available from Cabletron now. □

AT&T reclaims PRO WATS billing from the BOCs

1989	
December	Indiana Bell Telephone Co.
1990	
January	Southwestern Bell Telephone Co. customers in Missouri
June	The Chesapeake and Potomac Telephone Co. customers in Maryland, Virginia and Washington, D.C.
July	Bell Telephone Co. of Pennsylvania, The Ohio Bell Telephone Co. and South Central Bell Telephone Co. customers in Alabama, Delaware, Georgia, North Carolina and South Carolina
August	New York Telephone Co., Southern Bell Telephone and Telegraph Co. customers in Florida, and Wisconsin Bell, Inc.
September	Michigan Bell Telephone Co. and US West Communications customers in Oregon and Washington
October	New Jersey Bell Telephone Co., Nevada Bell, Pacific Bell and the rest of Southwestern Bell
1991	The rest of the BOCs are expected to transfer billing to AT&T in the early part of the year.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: AT&T, BASKING RIDGE, N.J.

AT&T reclaims job of Pro WATS billing

Carrier hopes taking responsibility from the Bells will give it more control over customer accounts.

By Bob Brown
Senior Editor

BEDMINSTER, N.J. — AT&T’s effort to take back direct billing of most of its Pro WATS customers from the Bell operating companies by year end is on schedule, AT&T and local telephone company officials said last week.

AT&T, which has previously reclaimed billing responsibilities for WATS and 800 services, has pushed hard this year to handle billing for its popular Pro WATS service in an effort to gain better control over its customer accounts.

AT&T officials consider this to be an important competitive move given that billing has become such a critical factor in large-user buying decisions and that AT&T’s long-haul rivals have had more flexibility in offering customized bills. By billing Pro WATS customers directly, AT&T plans to offer customized bills tailored to suit individual clients’ needs.

“When we have the ability to bill Pro WATS customers from the AT&T billing system, that allows us to provide the customer with any types of enhancements and changes to the service as quickly as possible,” said Jean Sault, district manager for business communications services billing strategies here. “Prior to this, we needed to go to each of the local exchange carriers billing in our honor and go through a negotiation process [that could take as long as a year].”

Bob Self, president of Market Dynamics, a New York market research firm, said, “This is an im-

portant step being taken by AT&T. It allows AT&T to be more responsive.”

Pro WATS is an outbound long-distance calling package targeted at business customers spending a maximum of \$2,500 a month on long-distance calls. It is described by AT&T officials as “a flagship product” that has doubled its customer base during the

By billing Pro WATS customers directly, AT&T plans to offer customized bills.



past year, though AT&T officials declined to provide any details about the size of its customer base or how much revenue the service generates.

For more than a year now, AT&T has been negotiating with the BOCs to provide a smooth transition from their billing systems to AT&T’s.

At this point, some BOCs are recording Pro WATS traffic and passing the information onto AT&T so that it can bill customers.

Industry observers said they expect AT&T will eventually take over the complete billing process, but AT&T officials declined to divulge when that might happen.

(continued on page 12)

INDUSTRY BRIEFS

COS to expand Mark program. The Corporation for Open Systems International (COS) has announced plans to expand the COS Mark program to test for several additional protocols.

COS has issued a request for information to the conformance testing community in an effort to expand the COS Mark program to include testing for additional File Transfer, Access and Management (FTAM) functionality, as well as testing capabilities for CCITT X.400 (1988 version), Directory Services (CCITT X.500) and OSI network management protocols.

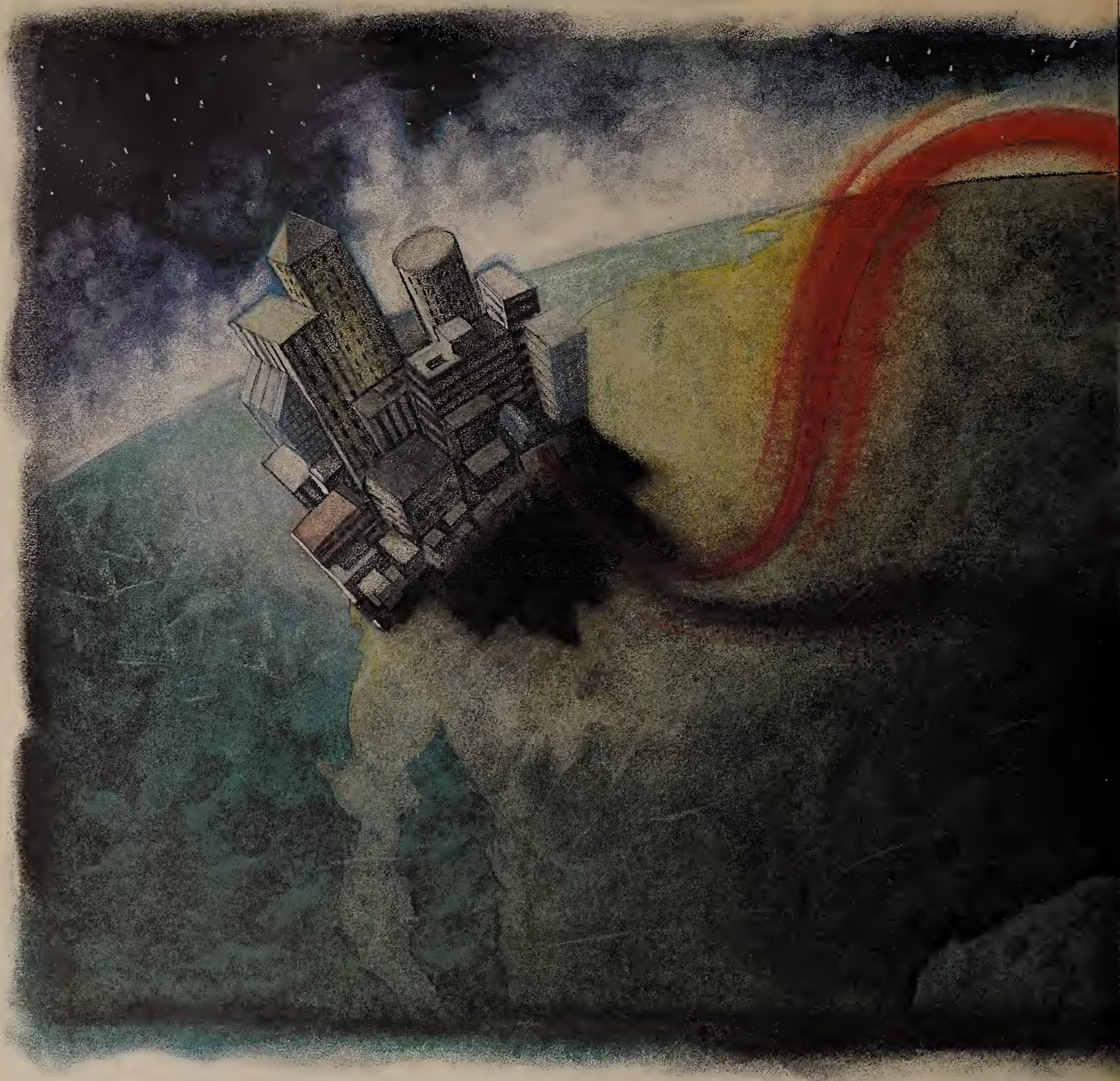
The COS Mark program expansion will be phased in during a two-year period. Currently, COS awards a COS Mark seal of approval to vendors’ FTAM and X.400 (1984 version) products that pass a battery of conformance tests.

The object of the COS Mark program is to identify and distinguish those products that have met COS requirements and, therefore, have an increased likelihood of interoperability.

AT&T forges more X.400 links. AT&T last week said it has established new X.400 connections to four service providers abroad.

AT&T has forged X.400 links in Austria with Radio-Austria ADA400, in the U.K. with British Telecommunications PLC’s Gold 400 and Sprint International Data Services, Ltd.’s Sprint-Mail, and in Italy with Italcable Omega400.

(continued on page 12)



Imagine a world where one company...



...connects the strengths of two. Where a hundred-year heritage of product quality joins with a bold spirit of innovative technological development. And a mutual commitment to helping the customer succeed creates one of the largest data communications support organizations in the world. Imagine value-added products and services that reflect a single-minded focus on customer satisfaction. Where one company's knowledge of your business connects with your own in a strategic partnership. Imagine, at

last, a single connection to successful data networking. Now, imagine that one company...
AT&T Paradyne.

To find out how you can connect with success in data networking, call 1 800 482-3333 Ext. 217.
In Canada, call 1 416 494-0453.

Europe (44) 923-55550 FAX: (44) 923-55638, Japan (81) 3-245-0431 FAX: (81) 3-245-0433, Hong Kong (85) 25-430083 FAX: (85) 25-413767, Latin America (1) 813-530-2873 FAX: (1) 813-530-2575



See The FAXNeT Form on Page 24

Industry Briefs

continued from page 9

In addition, AT&T Mail has completed testing with the U.S.-based BellSouth Advanced Networks, Inc., Pacific Bell Connection and Infonet Services Corp. Notice 400 services to guarantee that users can send messages between AT&T Mail and those network services.

Commercial interconnections are scheduled with these services in the first quarter of 1991.

Fibronics earnings, revenue jump. Fibronics International, Inc. last week reported third-quarter earnings of \$833,000 for the period ended Sept. 30, up 63% from earnings of \$510,000 in the

third quarter of 1989.

For the first nine months of the year, the Hyannis, Mass., maker of Fiber Distributed Data Interface products has earned \$2.6 million, up 86% over the \$1.4 million it earned in the first nine months of 1989.

Fibronics' revenue for the third quarter was \$16 million, up 34% from \$11.9 million reported in the third quarter last year. For the first nine months of the year, the company's revenue was \$45.5 million, up 32% from \$34.6 million for the corresponding period last year.

Fibronics cited strong demand for FDDI products as the reason for its healthy financials. Recent Fibronics product announcements include a DECnet router, translation bridge and a workstation server. □

AT&T reclaims job of Pro WATS billing

continued from page 9

AT&T kicked off its Pro WATS take-back program in December 1989, when the carrier began billing business customers in Indiana for Pro WATS and basic long-distance services that were previously handled by Indiana Bell Telephone Co.

In January, AT&T moved into Missouri, and throughout the year, it worked its way back and forth across the country, hitting New Jersey Bell Telephone Co., part of Southwestern Bell Telephone Co. and Pacific Bell during the past few months (see graphic, page 9).

Pro WATS users are automatically switched over to AT&T's billing system on a region-by-region basis, Sault said. Users

are alerted to this practice beforehand by AT&T, she said.

AT&T officials declined to say what percentage of their Pro WATS customers have been transferred to AT&T's billing system but that the transition has proceeded as planned and the carrier is ready to deal with GTE Telephone Operations in the new year.

AT&T plans to take back any billing from the few remaining BOCs that bill customers on AT&T's behalf.

What it means to users

The biggest change affecting users is the actual size and format of the bill, Sault said. AT&T is providing more complete call detail records so customers' accounting personnel can bill back calls to specific departments, for example, she said.

Future benefits will include bills that consolidate Pro WATS with other AT&T services, Sault said.

Users being directly billed by AT&T for Pro WATS said they are encouraged by the transition.

Phil Jones, manager of telecommunications at Kellwood Co., a St. Louis apparel maker, said AT&T has provided his company with very organized bills.

Kellwood uses AT&T's Megacom service at its headquarters here and Pro WATS at 30 remote sites. Under AT&T's direct billing service, Kellwood receives bills at each local site and a summary bill at the central site that enables the company to centrally track traffic patterns throughout the company, Jones said.

"Our billing was all over the place before, which made it hard to manage the network," Jones said.

Larry Lee, information systems manager at Alvey, Inc., a St. Louis maker of palletizers and a Pro WATS customer, said, "With AT&T doing the billing, there is less chance for error — there's no middle-man."

Market Dynamics' Self agreed.

"If I were a Pro WATS user, I'd want to be billed by AT&T," he said. "I'm not saying the BOC would screw it up, but there is another level of possibility for screwups."

While users are happy that AT&T is taking back billing for Pro WATS, the BOCs understandably are not overjoyed at losing a steady source of revenue generated from providing AT&T with billing services. Even so, AT&T reported that the BOCs have not been dragging their feet since they recognize that the transition was inevitable.

"I don't think any of us are happy to lose any billing business," said Ann Fast- ing, Pacific Bell's account manager for carrier billing services for AT&T. "But it would be unrealistic for us to sit here and pout and say, 'I don't want to lose it.' We've just got to focus on keeping what billing we can, namely small business and residential."

Fasting said there will be pros and cons for users that are switched to AT&T's direct billing.

On the plus side, AT&T may have more resources to put into expanded billing features than the BOCs do, she said. On the down side, however, is the fact that users may have to deal with an extra set of bills. Another minus could be that users will have to notify both AT&T and the local carrier when making changes to local service, something that previously could be accomplished by a call to the local carrier, Fasting said. □

British Telecom Is



International Private Circuits

Stay ahead of your competition by using a cost-effective *private direct link* to your overseas clients and business colleagues.

Your communications security is guaranteed and you have immediate access 24 hours a day. No long-distance codes; no busy periods. Call our toll-free number for complete details.

British Telecom is: International Communications Solutions, Global Network Services™, Financial Trading Systems, Data Communications Equipment and much more.

Contact British Telecom: 2560 North First Street
P.O. Box 49019 • San Jose, CA 95161-9019 • 800-872-7654

British
TELECOM®

Spirited.
Solid.
Strong.
Business Communications Around The World.

See The FAXNet Form on Page 24

TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

Worth Noting

Rockwell International Corp.'s Switching Systems Division in Downers Grove, Ill., estimates that its high-end Galaxy 3000 automatic call distributors handle 28 million calls a day nationwide.

Carrier Watch

Illinois Bell Telephone Co. last week asked the Illinois Commerce Commission for permission to offer a caller identification feature without call blocking to business and residential users in north-eastern Illinois late next year.

As proposed, Illinois Bell would sell caller ID, which delivers the calling party's telephone number, for \$6.50 per line per month.

This charge includes delivery of 300 telephone numbers. Illinois Bell would charge 2 cents for each additional telephone number delivered.

Illinois Bell has proposed offering caller ID to users in the rest of the state in 1994 as more local switching centers are equipped to offer the service.

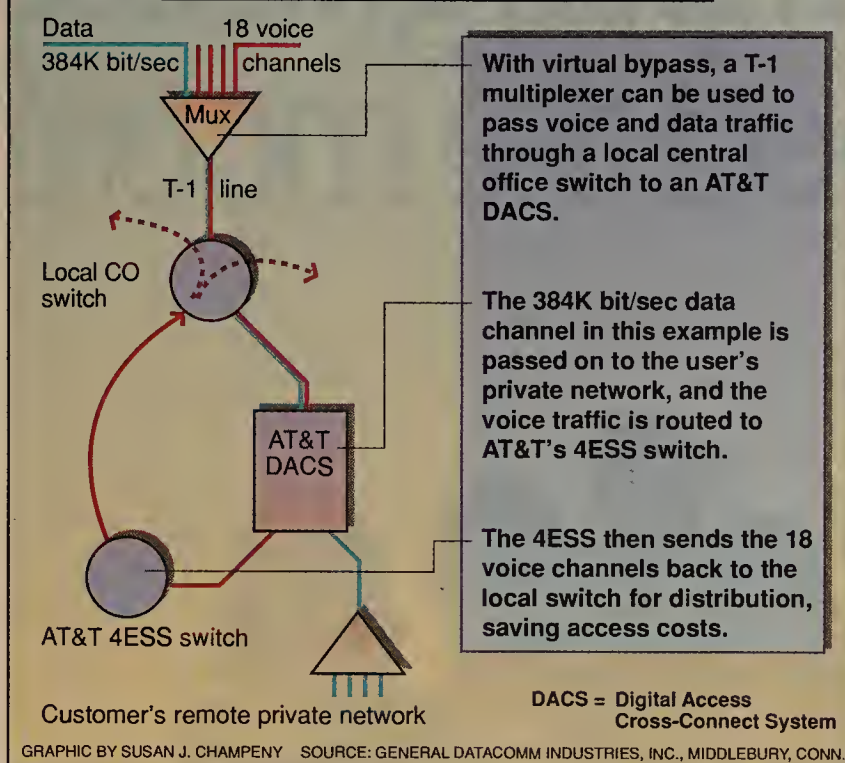
For more information on the proposed feature, call (800) 678-9868.

American Management Systems, Inc. (AMS) and **Bell Atlantic International, Inc.** recently announced an agreement under which the two firms will jointly market AMS TieLine software and consulting services worldwide.

TieLine, a billing, collection and service order system, is used by telecommunications companies for customer assistance.

AMS Chairman Charles Rossotti said the deregulation and privatization of post, telegraph and telephone administrations worldwide is serving to create new competitive opportunities for TieLine in foreign markets. ■

Virtual bypass boosts access efficiency and flexibility



Virtual bypass lets users tap unused T-1 bandwidth

Access can support fractional T-1, local traffic.

By Nathan Muller
Special to Network World

Since its introduction in 1988, fractional T-1 has been a topic of intense interest among those who manage corporate networks. After all, being able to order and pay for only enough bandwidth to support existing applications and make mesh networks more resilient are novel concepts in the telecommunications industry.

The trouble is that users must still use a full T-1 local pipe to access fractional T-1 interexchange services, even though they may only need one-quarter or one-half of the bandwidth.

The local exchange carriers have been slow to offer fractional T-1 access services, apparently because the falling price of T-1 has led many of them to believe that fractional T-1 is unnecessary and not worth the bother.

To date, only New England Telephone and Telegraph Co. offers tariffed fractional T-1 access, although some independent telephone companies offer it on an individual-case basis.

Large companies with bypass technologies already in place or that subscribe to the fiber-optic facilities of alternate access providers have more flexibility in sizing bandwidth to particular application needs.

But these are not viable solu-

Muller heads the consultant relations program at General DataComm Industries, Inc., a customer premises equipment vendor in Middlebury, Conn.

tions for smaller companies with limited budgets. For them, the only choice has been to pay for bandwidth they really don't need. In effect, the local exchange carriers have been lining their pockets at the expense of the little guy.

Enter virtual bypass. Under this relatively new concept, small users can turn this situation around — without resorting to high-cost bandwidth technologies.

The concept is simple: Users can fill the unused portion of a T-1 access pipe with usage-based traffic, including switched 56K bit/sec and Integrated Services

Users can fill the unused portion of a T-1 access pipe with usage-based traffic.

Digital Network B channels.

Subscribers can even use their local T-1 access pipes to access other services such as Megacom and Software-Defined Network service. AT&T offers this virtual bypass capability under its Static Integrated Network Access arrangement.

A user that wants only 384K bit/sec for a data application, for example, may fill the unused portion of the T-1 local access pipe
(continued on page 16)

Tariff 15 deal gets FCC nod but too late

AT&T deal would have given two firms discounts on SDN, but both have since moved on to MCI.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — AT&T recently won approval for a second Tariff 15 deal, but the users for which it filed the plan have since moved to another carrier.

The tariff, approved after an eight-month wait, would have given a 23% discount on domestic and international Software-Defined Network (SDN) services to both CBS and Shawmut National Corp. Officials from both companies said regulatory delays played a role in their decision to abandon the Tariff 15 deal but MCI had made an offer that was difficult to refuse.

CBS signed a three-year \$18 million deal with MCI in April, and Shawmut, which was offered the same Tariff 15 deal in May, signed a three-year \$7 million deal with MCI in June.

Although AT&T has no customer for its latest Tariff 15 deal, the proposal will be left on the books for future use, according to a company spokeswoman. AT&T

could pose the deal to subsidiaries of CBS or Shawmut not covered by the MCI contracts, or it could offer it to other customers, she said.

Another Tariff 15 deal without a customer is a discount plan for

The proposal will be left on the books.

▲▲▲

PepsiCo, Inc. Although the Federal Communications Commission has not decided whether to allow that deal to take effect, PepsiCo has already switched to an AT&T Tariff 12 contract.

AT&T acknowledges that there is little hope of a quick resolution on Tariff 15 and customers considering such deals will likely face long regulatory delays, but
(continued on page 16)

WASHINGTON UPDATE

BY ANITA TAFF

MCI moves to protect 900 number callers. In preparation for the rollout of its new 900 service Jan. 1, MCI Communications Corp. last week announced a set of policies designed to protect consumers from possible abuses by 900 providers. Services offered over 900 numbers allow callers to access information and chat services for a per-minute fee that is charged to their long-distance bill.

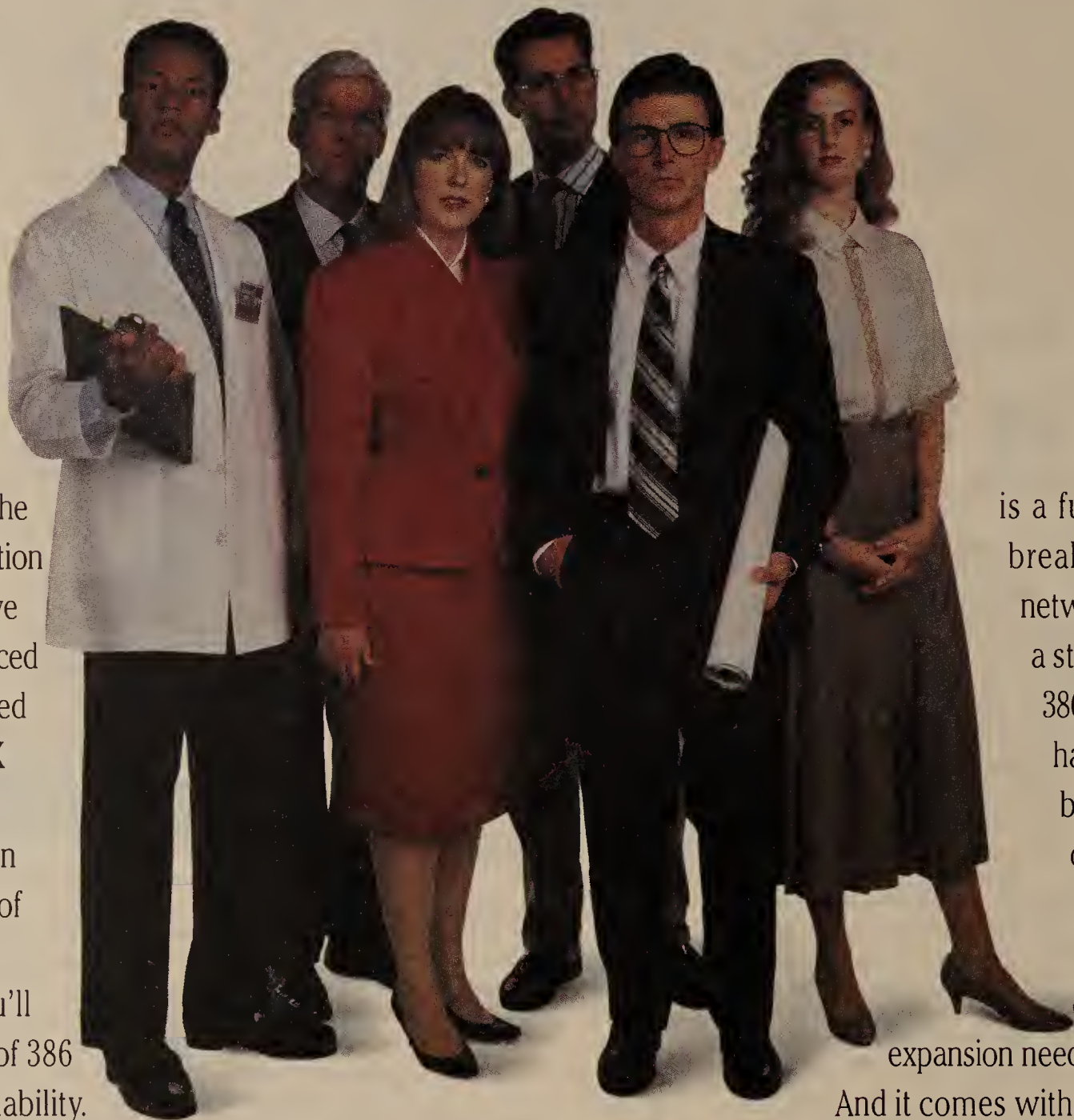
A controversy has erupted over these services because some consumers complain they or their children have been duped into running up hundreds of dollars of charges unknowingly. Other consumers have protested the services because they say some contain obscene material.

Earlier this year, Congress held hearings to determine whether legislation regulating the 900 industry was needed, but the matter was left pending when the lawmakers recessed.

MCI said it was voluntarily adopting guidelines to protect consumers against misleading or fraudulent 900 service providers. MCI's new guidelines will allow the carrier to: screen all 900 service content and ads to check for misleading information or offers; assign all services with adult language or content to a single prefix so that blocking can be accomplished more easily; impose a cap of \$4 per call for services targeted at children; and require all services to carry an introductory message explaining rates and giving the caller time to hang up before charges occur.

If companies wanting to employ the 900 service fail to comply with these guidelines or if MCI receives and verifies complaints against the service providers, the carrier would either terminate transmission lines, suspend billing services or both. ■

What does Compaq give 386 users who expect the moon?



Giving demanding users the best PC possible is a tradition at Compaq. A tradition we upheld when we introduced the world's first PCs based on Intel's 386 and 386SX microprocessors. And a tradition that continues in our comprehensive line of desktop PCs.

Within this line you'll find six different levels of 386 performance and affordability. And a PC designed to give you the perfect balance of features and power. You'll find the reliability and compatibility you've come to expect from Compaq. Plus the flexibility to choose from a wide array of optional features.

You'll also find an Authorized COMPAQ Computer Dealer, who's trained to match the right peripherals and software with the right PC. And to tailor a solution to your exact needs.

All at prices that are more competitive than ever.

Come look at the COMPAQ DESKPRO 386N Personal Computer, for example. This machine

is a full-function PC with breakthrough features for networked environments. As a stand-alone PC, its 16-MHz 386SX microprocessor handles all of the general business applications our other 386SX-based PCs run. With so many integrated features, you can take care of your expansion needs using only two slots.

And it comes with a host of unique network features like multilevel security, making it the best full-function personal computer for connected environments. All of this fits neatly into a space-saving design.

The COMPAQ DESKPRO 386S Personal Computer is also designed to handle general business applications. Its 16-MHz 386SX microprocessor gives you exceptional 386 performance. And its 32-bit architecture lets you run today's popular business software. It also offers the flexibility to run tomorrow's advanced business software.

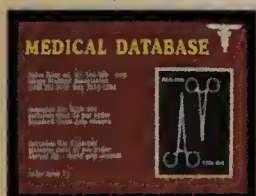


The stars.

Project managers and other general business users will find everything they need to manage databases and speed through complex spreadsheets in the COMPAQ DESKPRO 386S/20 Personal Computer. It delivers the



applications. It's the perfect personal computer for people who are serious number crunchers, administrators who manage massive loads of information as well as engineers who work on generating complex

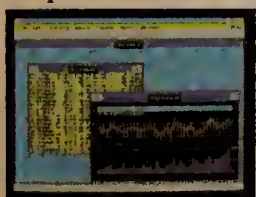


maximum in 20-MHz 386SX performance and a broad range of integrated features.

The COMPAQ DESKPRO 386/20e Personal Computer is for experienced users. It's perfect for demanding applications like presentation graphics. And it's loaded with high-performance features like an advanced cache architecture. So it runs up to 50% faster than other 20-MHz, non-cached 386-based PCs.

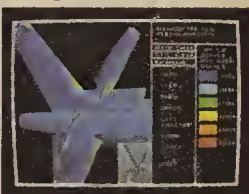


For users doing similar jobs, but with more stringent performance needs, we offer the COMPAQ DESKPRO 386/25e Personal Computer. Its 25-MHz 32-bit performance lets you fly through financial analysis as well as other demanding



two-dimensional CAD drawings.

At the most demanding level of 386 computing are the power users who do graphic-intensive applications like 3-D CAD drawings and other performance-intensive applications. These people need the kind of performance that the COMPAQ DESKPRO 386/33L Personal Computer delivers. It combines the fastest 386 microprocessor with high-performance innovations. And it lets you easily upgrade to the power of 486 performance.



If you're looking for the 386 desktop PC that simply works better for whatever you do, call 1-800-231-0900, Operator 129. In Canada, call 1-800-263-5868, Operator 129.

COMPAQ

It simply works better.

Virtual bypass lets users tap bandwidth

continued from page 13

with 18 channels of voice traffic to justify the cost of the access lines.

At the AT&T Digital Access Cross-Connect System (DACS), the dedicated 384K bit/sec channel and 18 switched channels are split out (see graphic, page 13).

The 384K bit/sec DS0 bundle is routed to its destination, while the 18 DS0s carrying voice can, at a nominal cost to the user, be routed by AT&T back to the local exchange carrier for distribution. In effect, the user gets 18 outgoing local channels at far less cost than 18 typical voice lines — depriving the local exchange carrier of usage-based revenue.

This form of bypass is virtual in that the full T-1 from the customer premises equipment to the local serving office is still required. But in using the T-1 line to deprive

vices for transport over the same T-1 line.

How devastating can virtual bypass become? Consider this: Without offering their customers 384K bit/sec fractional

If enough users opt for virtual bypass, the local carrier could become nothing more than a wire and cable company.



the local exchange carrier of usage-based revenue, the arrangement qualifies as bypass. This setup also qualifies as bypass when it is used to consolidate multiple ser-

T-1 and billing for it accordingly, the local exchange carriers are giving up much more in the form of usage-based revenue, and are justifying the trend toward in-

creasing use of virtual private networks.

Add voice compression via adaptive differential pulse code modulation into this equation, and the lost revenue to the local exchange carriers doubles. And, if enough customers opt for virtual bypass, the local exchange carrier could quickly become nothing more than a wire and cable company.

The only way that the local exchange carrier can counter this potentially devastating threat is to offer fractional T-1 access. Although this would involve installing a DACS at the local serving office, it would enable the local exchange carrier to bill customers for only the bandwidth ordered and eliminate the incentive to consolidate usage-based traffic onto the leased facility. ■

With All The High-Speed Features We've Built Into Our V.32 Modem It's Hard To Believe It Just Got Faster.



Digicom's new PLUS™ option V.32 modem increases the efficiency of your office, giving you more time to do the things you need.

Features:

- CCITT V.32bis standard
- 14.4K bps true full-duplex (async or sync)
- Asynchronous transfers possible to 38.4K bps
- CCITT V.42bis data compression feature
- Worldwide compatibility automatic fallback to MNP™ class 5
- 2 year warranty
- Toll free support number



*Values of 3:1 for most files

It's true.

Digicom Systems has improved on its already outstanding V.32 technology. Now we've designed our V.32 standard modems to run at 14.4K bps. The PLUS™ option available now through DSI speeds the way for you to realize a 50% im-

14.4-38.4 Kbps

provement in actual modem performance. And that's at full-duplex.

Time is Money

Even at 9600 bps every additional second costs

your company in time and line charges. At 14.4K bps it costs significantly less! Especially over a long distant link.

Whether your application is synchronous or asynchronous, a 50% improvement can be expected. Resulting in streamlined network



throughput and significant cost savings, it is ideal for data base access

and point-of-sale applications. You are guaranteed our PLUS™ option V.32 modems will make the most of every second your network has to offer.

4:1 Compression

The CCITT V.42bis data compression feature is included with our PLUS™ option, allowing effective asynchronous data transfers that reach 38.4K bps. This standard ensures worldwide compatibility and up to 4:1 data compression.*

Digicom Systems new V.32 modem with the PLUS™ option. Faster, more efficient and cost effective.

Digicom Systems, Inc. Ahead of the competition, and staying there.



Digicom Systems, Inc.

279 Sinclair Frontage Rd.
Milpitas, CA 95035
408/262-1277

for more information call
1-800-833-8900

Tariff 15 deal gets FCC nod but too late

continued from page 13

the carrier intends to press forward with the controversial tariff.

"We still think Tariff 15 is one of the only ways for us to police the marketplace and match the off-tariff offers our competitors are allowed to make," the spokeswoman said.

AT&T has not, however, put in for a new Tariff 15 plan since it filed an offer for Rohm & Haas Co. in August for reduced charges on remote access SDN calls. The customer requested that AT&T withdraw the deal a few weeks later.

Adding to the problem of customer flight is the FCC's reluctance to declare the legality of the customer-specific deals. The commission has been examining the lawfulness of the offers since 1988, when AT&T filed its first discount plan for Holiday Corp. Because AT&T is regulated as a dominant carrier and is prohibited by the Communications Act of 1934 from discriminating among customers, many complain that Tariff 15 deals are illegal.

The deal for Holiday Corp. was ultimately rejected by the FCC as unlawful, and the hotel chain switched to a tariffed SDN service.

Since then, the FCC has allowed two deals — one for Resorts Condominium International, Inc. and this latest CBS/Shawmut deal — to take effect, but those customers can't take much solace in the roundabout way the FCC gave its blessing.

In both cases, the FCC allowed the deals to take effect only after it ran out of time to investigate them. According to FCC rules, the agency can take 90 days to decide how it will handle a tariff and then it has another five months to suspend and investigate it. After that period passes, if the FCC doesn't declare the offering illegal, it takes effect automatically.

The problem is that these deals are still technically under investigation, and the FCC could come back at a later date and declare the deals unlawful.

Many observers speculate that the FCC is purposely stalling a final decision on the legality of Tariff 15. It is widely believed that the FCC wants to put off the Tariff 15 decision until it can complete a more comprehensive review of AT&T's dominance in the long-distance marketplace.

If that is true, the best that any Tariff 15 customer can hope for is to receive service after waiting for eight months, the maximum amount of time the FCC can delay a tariff without declaring it illegal. There are now seven other customers waiting for deals to take effect. ■

See The FAXNeT Form on Page 24

Have you moved?

To change your address of your subscription, simply attach your mailing label to this form, fill in your new address, complete the questions and return this form to us.

Fold Here



FREE subscription application

Why wait to read someone else's copy of *NETWORK WORLD*? You can have your own copy on your desk every week.

To apply for a FREE subscription, simply complete this subscription application form and return it to us.

Fold & Tape Here

Note!

Please answer ALL questions, sign and date the application. Incomplete forms cannot be processed or acknowledged. For those questions requesting quantities, please respond with specific numbers. The publisher reserves the right to limit the number of free subscriptions accepted in any business category.

Your name, title, company name and company address must appear in the space provided for your application to be processed, or you may affix your business card. Subscriptions cannot be mailed to a home address.

Thank You!

NETWORK WORLD

The Newsweekly of Enterprise Networking Strategies

Fold Here

PLACE
POSTAGE
STAMP
HERE

NETWORK WORLD

The Newsweekly of Enterprise Networking Strategies

P.O. BOX 1021
SOUTHEASTERN, PA 19398-9979



Qualification Form

Pass-Along Qualification Form

A. I Wish to Receive a FREE Subscription to *Network World*.

YES ☐ NO ☐

Signature Date
Business Phone

B. Please Provide your Name, Title & Company Address.

DR./MR./MRS./MS. First Name Middle Name Last Name
TITLE
COMPANY NAME
DIVISION/DEPARTMENT
STREET ADDRESS
CITY STATE ZIP

C. Please Answer ALL Questions, Sign & Date the Form.

1 Industry: (check one only)

- 01. ☐ Manufacturers (other than computer/communications)
- 02. ☐ Finance/Banking
- 03. ☐ Insurance
- 04. ☐ Real Estate
- 05. ☐ Healthcare Services
- 06. ☐ Legal
- 07. ☐ Hospitality
- 08. ☐ Retail/Wholesale Trade
- 09. ☐ Transportation
- 10. ☐ Utilities
- 11. ☐ Education
- 12. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
- 13. ☐ Government State/Local
- 14. ☐ Government Federal
- 15. ☐ Military
- 16. ☐ Aerospace
- 17. ☐ Consultants (independent)
- 18. ☐ Carriers
- 19. ☐ Interconnects
- 20. ☐ Manufacturers (Computer/Communications)
- 21. ☐ VAR/VAD/Systems House
- 22. ☐ Distributor, Computer Related
- 23. ☐ Distributor, Communications Related
- 24. ☐ Other

2 Job function: (check one only)

- 1. ☐ Networking Management (Responsible for both voice & data)
- 2. ☐ MIS Management (VP, Dir., Department Head)
- 3. ☐ Corporate Management (Chairman, President, Owner, General Manager, CEO, CIO, VP)
- 4. ☐ Data Communications Management (Responsible for data only)
- 5. ☐ Telecommunications Management (Responsible for voice only)
- 6. ☐ Financial Management
- 7. ☐ Engineering Management
- 8. ☐ Consultant (Independent)
- 9. ☐ Other

3 What is the scope of your involvement in purchase decisions for Network/Communications products + services? (check one only)

- 1. ☐ Enterprise Wide (Organization/Subsidiary/Division)
- 2. ☐ Multi Enterprise (Consultants)
- 3. ☐ Department Wide

4 What is the total number of sites for which you have purchase influence?

- 1. ☐ 100 +
- 2. ☐ 50 - 99
- 3. ☐ 20 - 49
- 4. ☐ 10 - 19
- 5. ☐ 2 - 9
- 6. ☐ 1

5 Your primary responsibility: (check one only)

- 1. ☐ Both Data + Voice
- 2. ☐ Data Networking Only
- 3. ☐ Voice Networking Only
- 4. ☐ None

6 Which transmission media do you use in your network: (check all that apply)

- Public:
- 01. ☐ Switched-Based
 - 02. ☐ Leased Line (not including T-1)
 - 03. ☐ T-1
 - 04. ☐ Fractional T-1
 - 05. ☐ T-3/SONET
 - 06. ☐ Broadband (DDF, Wats, Megacom, etc.)
 - 07. ☐ ISDN
 - Private:
 - 08. ☐ Satellite
 - 09. ☐ Microwave
 - 10. ☐ Fiber Optic

7 Is your network: (check all that apply)

- LOCAL AREA NETWORK
- 1. ☐ Local (within building)
 - 2. ☐ Local (in a campus environment)
 - 3. ☐ International
 - 4. ☐ National
 - 5. ☐ Regional (several states)
 - 6. ☐ Metropolitan

8 What is your network architecture? (check all that apply)

- 1. ☐ SNA
- 2. ☐ DECNET
- 3. ☐ OSI
- 4. ☐ GOSIP
- 5. ☐ MAP/TOP
- 6. ☐ TCP/IP
- 7. ☐ DCA (UNISYS)
- 8. ☐ OTHER

9 What is your LAN Operating System? (check all that apply)

- 01. ☐ 3COM (3+, 3+ open)
- 02. ☐ LOCAL TALK (APPLETALK)
- 03. ☐ BANYAN (VINES)
- 04. ☐ DCA (IRMALAN)
- 05. ☐ IBM (LAN Server)
- 06. ☐ IBM (PC LAN PROGRAM)
- 07. ☐ MICROSOFT (LAN MANAGER)
- 08. ☐ UNGERMAN BASS (NET/1)
- 09. ☐ NOVELL (NETWARE)
- 10. ☐ TOPS
- 11. ☐ PROTEON (PRONET)
- 12. ☐ OTHER

10 What is your LAN environment? (check all that apply)

- 1. ☐ 4M TOKEN RING
- 2. ☐ 16M TOKEN RING
- 3. ☐ ARCNET
- 4. ☐ ETHERNET
- 5. ☐ STARLAN
- 6. ☐ FDDI
- 7. ☐ LOCALTALK
- 9. ☐ PICK
- 8. ☐ OTHER

11 Which operating systems do you utilize? (check all that apply)

- 1. ☐ IBM DOS (VSE)
- 2. ☐ UNIX
- 3. ☐ OS/2
- 4. ☐ OS/2 Extended Edition
- 5. ☐ MVS
- 6. ☐ VM
- 7. ☐ VMS
- 8. ☐ XENIX
- 9. ☐ PICK
- 0. ☐ OTHER

12 Please indicate by vendor the number of mainframes/minicomputers installed in your network.

VENDOR	MAINFRAMES		MINIS
	A	B	
01. DEC			
02. IBM			
03. AMDAHL			
04. AT&T			
05. BULL HN IS			
06. NCR			
07. DATA GENERAL			
08. WANG			
09. HEWLETT PACKARD			
10. PRIME			
11. TANDEM			
12. UNISYS			
13. CONTROL DATA			
14. OTHER			

13 Please indicate by vendor the number of microcomputers/workstations:

- A. Presently installed in your network.
B. The approximate quantity you plan to install in the next 12 months.

MICROCOMPUTER/ WORKSTATION/ VENDOR	PRESENTLY INSTALLED		PLAN TO INSTALL NEXT 12 MONTHS
	A	B	
01. PCs based on 80286 chip			
02. PCs based on 80386 chip			
03. PCs based on 80486 chip			
04. 8086/8088			
05. Macintosh			
06. RISC-based workstations			
07. UNIX-based workstations			

14 What is your planned PC standard? (check all that apply)

- 1. ☐ EISA
- 2. ☐ MCA
- 3. ☐ NUBUS (MACINTOSH)

15 For which areas outside of the U.S. do you have purchasing influence? (check all that apply)

- 1. ☐ Europe
- 2. ☐ Asia
- 3. ☐ South America
- 4. ☐ Australia
- 5. ☐ Middle East

16 Check ALL that apply in columns A and B

- A) I am presently involved in the purchase process for the following products/services:
- B) I plan to purchase the following products/services in the next 12 months:

Presently Involved	Plan to Purchase	A	B	LOCAL AREA NETWORKS:
01. ☐	☐			Local Area Networks
02. ☐	☐			LAN Servers
03. ☐	☐			LAN Services
04. ☐	☐			Cables, Connectors, Baluns
05. ☐	☐			Bridges, Routers, Gateways
06. ☐	☐			UPS
07. ☐	☐			LAN Storage Devices
A	B			COMPUTERS/PERIPHERALS:
08. ☐	☐			Micros
09. ☐	☐			Minis
10. ☐	☐			Mainframes
11. ☐	☐			Front End Processors
12. ☐	☐			Terminals
13. ☐	☐			Laptops
14. ☐	☐			Printers
15. ☐	☐			Work Stations
16. ☐	☐			Cluster Controllers

(continued on next column)

Presently Involved	Plan to Purchase	A	B	SOFTWARE:
17. ☐	☐			Network Management
18. ☐	☐			Micro to Mainframe
19. ☐	☐			Network Security
20. ☐	☐			Call Accounting
21. ☐	☐			Distributed DBMS
22. ☐	☐			Communications Software
23. ☐	☐			Applications Software
24. ☐	☐			Network Operating Systems Software
25. ☐	☐			EDI Software
26. ☐	☐			E-Mail Software
A	B			DATA COMMUNICATIONS:
27. ☐	☐			Modems (over 9.6kbps)
28. ☐	☐			Modems (under 9.6kbps)
29. ☐	☐			T-1 Multiplexers
30. ☐	☐			T-3 Multiplexers
31. ☐	☐			Fractional T-1 Multiplexers
32. ☐	☐			Data Switches
33. ☐	☐			Matrix Switches
34. ☐	☐			Packet Switches
35. ☐	☐			Protocol Converters
36. ☐	☐			Network Management Systems
37. ☐	☐			Terminal Emulation Boards
38. ☐	☐			Facsimile Machines
39. ☐	☐			Diagnostic Test Equipment
40. ☐	☐			DSU/CSU
41. ☐	☐			Data Security
42. ☐	☐			Data Compression Equipment
43. ☐	☐			Network Adapter Boards
44. ☐	☐			Microwave
45. ☐	☐			Messaging Software
A	B			TELECOMMUNICATIONS:
46. ☐	☐			PBXs (over 1000 lines)
47. ☐	☐			PBXs (200 - 1000 lines)
48. ☐	☐			PBXs (under 200 lines)
49. ☐	☐			Key Systems
50. ☐	☐			Automatic Call Distributors
51. ☐	☐			Voice Messaging Systems
52. ☐	☐			Video Teleconferencing Systems
A	B			SERVICES:
53. ☐	☐			Switched Voice
54. ☐	☐			Dedicated Leased Line
55. ☐	☐			T-1
56. ☐	☐			T-3
57. ☐	☐			Digital Data
58. ☐	☐			Packet Switched
59. ☐	☐			Centrex
60. ☐	☐			Central Office LAN
61. ☐	☐			Satellite
62. ☐	☐			On-Line Information
63. ☐	☐			ISDN
64. ☐	☐			EMail
65. ☐	☐			VSAT

17 Estimated value of networking equipment and services:

A: Which you helped specify, recommend or approve in the last 12 months?

B: Which you plan to help specify, recommend or approve in the next 12 months?

- | A | B |
|--|--|
| 1. ☐ \$100 million and over | 1. ☐ \$100 million and over |
| 2. ☐ \$50 - \$99.9 mill. | 2. ☐ \$50 - \$99.9 mill. |
| 3. ☐ \$25 - \$49.9 mill. | 3. ☐ \$25 - \$49.9 mill. |
| 4. ☐ \$20 - \$24.9 mill. | 4. ☐ \$20 - \$24.9 mill. |
| 5. ☐ \$10 - \$19.9 mill. | 5. ☐ \$10 - \$19.9 mill. |
| 6. ☐ \$5 - \$9.9 mill. | 6. ☐ \$5 - \$9.9 mill. |
| 7. ☐ \$1 - \$4.9 mill. | 7. ☐ \$1 - \$4.9 mill. |
| 8. ☐ \$500,000 - \$999,999 | 8. ☐ \$500,000 - \$999,999 |
| 9. ☐ Under \$500,000 | 9. ☐ Under \$500,000 |

18 Estimated gross annual revenue of your entire company/institution: (check one only)

- | | |
|--|--|
| 1. ☐ over \$10 billion | 5. ☐ \$50 to \$99.9 mill. |
| 2. ☐ \$1 to \$9.9 bill. | 6. ☐ \$10 to \$49.9 mill. |
| 3. ☐ \$500 to \$1 bill. | 7. ☐ \$5 to 9.9 mill. |
| 4. ☐ \$100 to \$499.9 mill. | 8. ☐ under \$5 mill. |

19 Estimated number of employees for your entire corporation:

- | | |
|---|---|
| 1. ☐ over 10,000 | 4. ☐ 1,000 - 2,499 |
| 2. ☐ 5,000 - 9,999 | 5. ☐ 500 - 999 |
| 3. ☐ 2,500 - 4,999 | 6. ☐ under 500 |

20 Which of the following ISDN products do you plan to purchase in the next 12 months? (check all that apply)

- 1. ☐ Basic Rate Interface Terminal Adapters
- 2. ☐ Primary Rate Interface Equipment
- 3. ☐ Voice/Data terminals
- 4. ☐ Voice-only terminals
- 5. ☐ Data-only terminals

21 From which of the following vendors will you consider buying your PBX/Central Office Switch? (check all that apply)

A	B	PBX	COS	
☐	☐	A	☐	AT&T
☐	☐	B	☐	ALCATEL
☐	☐	C	☐	ERICSSON
☐	☐	D	☐	FUJITSU
☐	☐	E	☐	HARRIS
☐	☐	F	☐	HITACHI
☐	☐	G	☐	ROLM
☐	☐	H	☐	INTECOM
☐	☐	I	☐	MEMOREX TELEX
☐	☐	J	☐	MITEL
☐	☐	K	☐	NEC
☐	☐	L	☐	NORTHERN TELECOM
☐	☐	M	☐	SAMSUNG
☐	☐	N	☐	SIEMENS
☐	☐	O	☐	STROMBERG-CARLSON
☐	☐	P	☐	TOSHIBA
☐	☐	Q	☐	OTHER

NETWORK WORLD

The Newsweekly of Enterprise Networking Strategies
An IDG Publication

DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

The nation's 80,156 automated teller machines generated 474.9 million transactions per month in 1990, up from the 422.2 million monthly transactions generated by 75,632 ATMs in 1989, according to an annual ATM network survey by the Bank Administration Institute and "Bank Network News."

Data Packets

BT Tymnet, Inc. last week enhanced its MultiPoint Synchronous Data Link Control service to enable IBM Application System/400 minicomputers running Advanced Peer-to-Peer Networking software to communicate with one another over the firm's X.25 network.

MultiPoint SDLC eliminates the large number of multidrop lines that feed data from remote sites to a centralized host.

Previously, the service linked remote IBM 5250 cluster controllers to AS/400s, remote IBM 3274 cluster controllers to IBM mainframes, or it linked mainframes using LU 6.2.

BT Tymnet also enhanced MultiPoint SDLC to enable IBM cluster controllers configured as PU 2.1 nodes to communicate with IBM mainframes over its X.25 network.

The company said it will offer the service for a single flat rate.

With MultiPoint SDLC, users connect a cluster controller to the nearest BT Tymnet node via a leased or dial-up line at 4.8K or 9.6K bit/sec.

The AS/400 or mainframe is also linked to a BT Tymnet node via a leased line at 9.6K, 19.2K or 56K bit/sec.

Under its flat-rate pricing
(continued on page 20)

National Guard pilots OSU's VSAT videoconferencing net

Should significantly reduce the cost of training.

By Paul Desmond
Senior Editor

STILLWATER, Okla. — Oklahoma State University (OSU) has constructed a four-site, satellite-based videoconferencing network to support a National Guard training application that could eventually serve more than 500 locations.

Four sites in Kentucky are serving as a pilot network to validate the effectiveness of using videoconferencing for instructional applications. Early studies indicate that the network could reduce educational costs from the current \$30 per hour per student to \$2.50 per hour.

OSU, which is the military's prime contractor for the videoconferencing network, is using Hughes Network Systems, Inc.'s (HNS) InTELEconference very small aperture terminal satellite equipment to provide videoconferencing services at a lower cost than is possible with terrestrial digital services, said Marshall Allen, director of educational television at OSU's campus here.

HNS claims InTELEconference, which is VSAT equipment tailored for videoconferencing, costs 20% to 30% less than com-

parable terrestrial services, depending on configuration.

Plus, VSATs can be installed nearly anywhere and can be moved as needs dictate, said Rob Montgomery, marketing manager at HNS. The digital services typically used to support video are not available everywhere and require advance planning for changes or additions.

But the most important aspect of the HNS equipment to the National Guard was the system's ability to support various multipoint conferencing configurations, Allen said. One such feature lets users at as many as eight sites hear one another speak while receiving a video feed from a single host site. Another feature adds the ability for the host site to receive a video signal from one remote site at a time.

The National Guard will test those features to verify the effectiveness of using videoconferencing for instructional purposes. If factors such as student comprehension and retention are deemed acceptable, the video net could be spread to as many as 524 National Guard armories, Allen said.

(continued on page 20)

Survey: E-mail expected to survive '91 budget cuts

By Jim Brown
Senior Editor

WAYNE, Pa. — Soft-Switch, Inc. last week said it surveyed some of its largest electronic mail users and found that the majority are not planning to cut spending for E-mail products, despite the sagging economy.

The survey, which asked 50 companies to comment on E-mail spending in general — not just on plans to purchase Soft-Switch products — revealed that more than one-third of the respondents plan to increase E-mail spending.

The vendor conducted the survey two weeks ago at its 1990 Users Conference in Orlando, Fla.

Soft-Switch said 36% of the respondents plan to increase spending on E-mail products next year, while 33% intend to budget the same amount of money for E-mail next year as they did this year.

Users did not divulge how much they will spend, but 25% said they will cut E-mail spending

by as much as 10% next year. The remaining 6% will slash E-mail spending by more than 10%.

Soft-Switch officials were pleased, although a bit surprised, with the results. "Given the strangeness in the economy at the moment, we thought everybody's budget would be decreasing," said Walt Wilson, Soft-Switch's director of marketing communications, who compiled the survey results.

The survey findings are in line with purchasing trends E-mail analysts are uncovering. "I have not heard any evidence that people are going to cut back E-mail spending," said David Atlas, a senior analyst for electronic messaging at International Data Corp. (IDC), a market research firm in Framingham, Mass.

Even though he agreed with the findings on purchasing plans, Atlas warned that Soft-Switch's survey should not be viewed as scientifically accurate since so few companies participated.

(continued on page 20)

Switched service access schemes

Type of support for ISDN PRI promised by T-1 mux vendors to access high-speed switched services

Vendor	Internal PRI support	External gateway	Estimated availability
Avanti Communications Corp.	✓	✓	1Q 1991 (external), 2Q 1991 (internal)
General DataComm Industries, Inc.	✓		now
Infotron Systems Corp.	✓	*	1 year or more
Netrix Corp.	✓		2nd half 1991
Network Equipment Technologies, Inc.	would not disclose	would not disclose	mid- to late 1991
Newbridge Networks, Inc.	✓		2nd half 1991
Racal-Milgo	✓		late 1991 to early 1992
Stratacom, Inc.	✓		late 1991 to early 1992
Timeplex, Inc.	✓	✓	2Q 1991 (external), 4Q 1991 (internal)

*Recommends Teleos Communications, Inc. product
PRI = Primary Rate Interface

GRAPHIC BY SUSAN SLATER

SOURCE: NETWORK WORLD

Vendors mull access to switched services

T-1 mux makers devise varied routes to support ISDN PRI access to high-speed switched services.

By Paul Desmond
Senior Editor

While carriers are busy rolling out high-speed switched data services, T-1 multiplexer vendors are weighing options to provide access from their products to the new services.

T-1 equipment makers' decisions on how to access high-speed switched services will depend in large part on how they opt to support the Integrated Services Digital Network Primary Rate Interface (PRI), since AT&T and MCI Communications Corp. will offer PRI access to switched 384K bit/sec and T-1 services. US Sprint Communications Co. has not yet announced a high-speed switched offering.

T-1 multiplexer vendors say they will either offer an internal module that supports PRI or provide an external converter device that supports the interface (see graphic, this page).

But PRI will not be the sole method of accessing high-speed switched services. Initially, MCI will require a dedicated T-1 on the local loop — because local exchange carriers don't yet offer high-speed switched services — and will use a separate 9.6K bit/sec leased or dial-up modem connection to pass Q.931 signaling data to an MCI point of presence, according to George McFadden, MCI's product manager for the switched T-1 and T-3 services.

Q.931 is the protocol used on ISDN D channels. The carrier plans to support PRI access in the second half of 1991, he said.

McFadden said that having two access modes gives users more options for accessing the service. With the out-of-band signaling provided by the modem link, users can run software that provides Q.931 signaling on a per-

PRI will not be the sole method of accessing high-speed switched services.

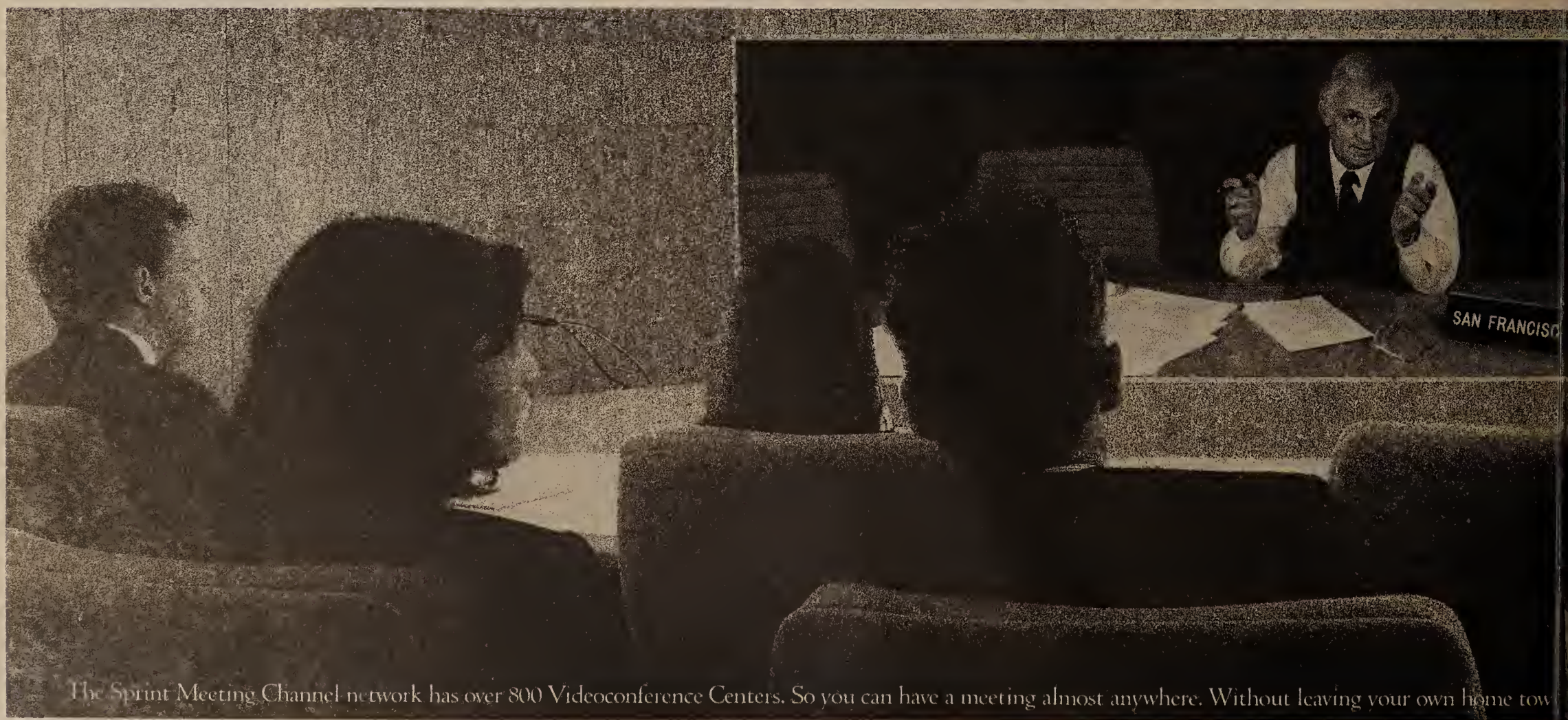
▲▲▲

sonal computer attached to the modem. Alternatively, the signaling software can run as part of the application that will be using the switched connection, such as a high-speed file-transfer application.

Under that scenario, no changes are required to the multiplexing equipment supporting the T-1 or T-3 link, if any is used.

Using PRI to access high-speed switched data services has its advantages, too, most notably that the PRI link can also be used
(continued on page 20)

SUCCESS EXECUTIVES ARE ALWAYS MORE MORE

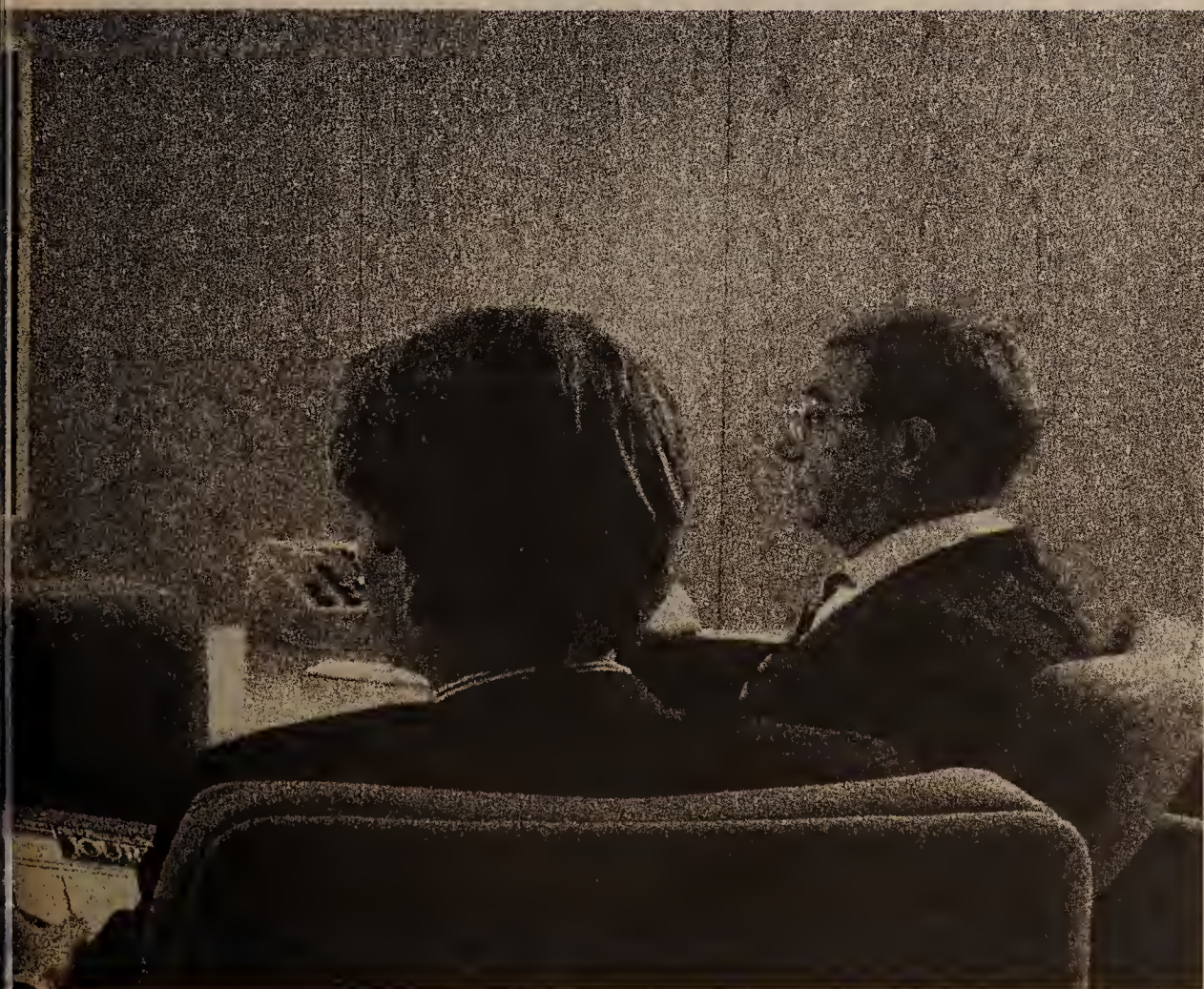


The Sprint Meeting Channel network has over 800 Videoconference Centers. So you can have a meeting almost anywhere. Without leaving your own home town.

© 1990 US Sprint Communications Company Limited Partnership

1984 Sprint begins construction of the first and only coast-to-coast digital fiber optic network. 1985 Sprint introduces the world's first virtual network. 1987 Eight million FÖNCARDS distributed in fi

SSFUL TTIVES TCHING E AND E TV.



Not soap operas, quiz shows or talk shows.
They're watching each other.

For example, you're in Los Angeles. You have a meeting in New York at 10:00a.m. And another one in Chicago at 2:00p.m.

What do you do? You use the Sprint Meeting Channel.SM It's the world's largest network of videoconference centers. Over 800, in fact.

And as you're sitting in Los Angeles, watching TV from New York and Chicago, New York and Chicago are watching TV from Los Angeles.

You can smile, wave, roll your eyes in disgust, show charts, blueprints, ads, models. You can even zoom in on a cup of coffee and tell if it has cream in it.

Anyway, if you're tired of trying to be in three places at once, call Sprint at 1-800-733-4544. This is one case where the more TV you watch the more you get done.



Sprint Conferencing
IT'S A NEW WORLD™

Survey: E-mail to survive cuts

continued from page 17

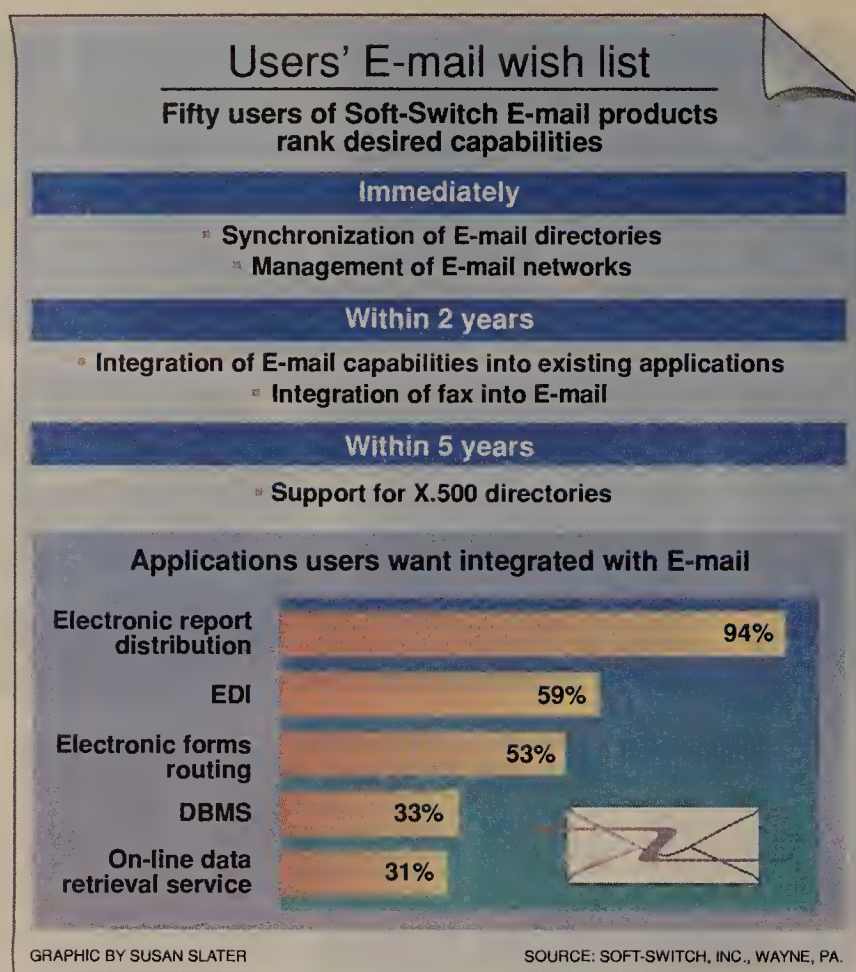
IDC is currently conducting its own study covering the E-mail market that will soon be published, he said.

Aside from the purchasing plans, the survey also found users are increasingly relying on X.400 gateways to link private E-mail networks to public E-mail services or to a trading partner's E-mail network. In fact, half of the survey respondents have already installed X.400 gateways, while another 25% expect to implement X.400 gateways within two years.

According to the survey, 6% of the users have replaced vendor-proprietary backbone E-mail networks with X.400. Another 10% plan to install an X.400 backbone in the next year, while 20% plan to install X.400 capabilities within two years. Of the remainder, 25% plan to implement an X.400 backbone within four years, while 8% plan to have one in five or more years and 31% do not plan to support X.400 at all.

The survey also asked users to rank the capabilities they most want from new E-mail products and identify when they want to see those capabilities delivered (see graphic, this page). Topping the list were products that keep distributed E-mail directories on a network synchronized by making sure a change to one directory is updated on others.

Users also want tools for managing E-mail networks better,



software that converts facsimile documents to E-mail messages and vice versa, and application program interfaces (API) that enable them to add E-mail capabilities to existing applications.

Asked how they would use E-mail APIs, 94% of the users said they wanted to enable such applications as spreadsheets and word processing programs to electronically distribute the reports and documents they generate.

Another 59% want to enhance applications that create electronic data interchange documents such as purchase orders with the

ability to send the EDI document via an E-mail network.

For 53% of users, the ability to use E-mail to route electronic forms such as a travel reimbursement request to the appropriate people for approval is important.

Another 33% want the ability to let end users fill out an E-mail message to request data from a data base management system. That E-mail message would be translated by the DBMS into an SQL request to extract the data. The DBMS would then send the extracted data back to the users via E-mail. ■

National Guard pilots VSAT net

continued from page 17

"The military can pick their best faculty to be available instantly to everyone at the same time," he said. Also, it will limit travel for both guardsmen and for instructors who today must meet in the same classroom. It will also reduce the number of instructors required, all of which contribute to the dramatic drop in training costs that video is expected to produce.

The expansion of the net is at the U.S. government's option. OSU's contract, worth \$1.2 million to date, is guaranteed only for one year but has four renewable one-year extensions, Allen said.

So far, OSU has installed videoconferencing equipment from HNS and Compression Labs, Inc. (CLI) at four National Guard sites in Kentucky: Barbourville, Frankfort, Lexington and Louisville.

At each site, a 2.4-meter VSAT is linked to an indoor unit that provides modulation, demodulation, transmission and reception of the video and audio signals.

A personal computer-based control unit attached to the indoor unit enables the user to configure the various options for the

videoconference.

Also attached to the indoor unit are the cameras, monitors, microphones, speakers and a video coder/decoder. That equipment is provided by CLI, which is a subcontractor to OSU for the network, Allen said.

To support the shared audio portion of its multipoint feature, the InTELEconference system uses a time-division multiple access scheme whereby each of as many as eight sites is given a time slot on the same frequency during which to transmit compressed audio, said Tom Naugler, program manager at HNS.

A two-way multipoint feature takes that a step further by also giving the host site the ability to receive a video response from one of the eight receiving sites at a time.

OSU will use the two-way multipoint mode for applications in which instructors need to see and hear responses from students at the remote site, Allen said.

For example, the feature will be used in a three-site video net OSU is building under a separate contract with the Defense Language Institute (DLI), Allen said.

"As we were getting ready to send troops to Saudi [Arabia], there was extensive effort at foreign language instruction," Allen said. From a base in Monterey, Calif., the DLI's best instructors will give language instruction to troops in Fort Riley, Kan., and Fort Lewis, Wash.

The two-way multipoint feature gives instructors the ability not only to hear but also to see students as they attempt to pronounce new words. ■

Data Packets

continued from page 17

plan, BT Tymnet will provide users with the leased or dial-up line, modems and software needed to connect to the network, as well as the ability to transmit an unlimited number of characters for a single monthly price.

Pricing to link cluster controllers to the network ranges from

\$400 to \$650 a month, with a onetime installation charge of \$1,000 for a dial-up line and \$1,200 for a leased line.

The monthly charge for a single host link to the network ranges from \$900 to \$4,200, while the installation charge is waived for a 9.6K bit/sec link. Installation costs \$2,000 for a 19.2K bit/sec link and \$3,000 for a 56K bit/sec link. ■

Vendors mull access to service

continued from page 17

to access other carrier services such as toll-free 800 lines.

So far, only one T-1 multiplexer vendor — General DataComm, Inc. — has a multiplexer that can support both the Q.931 D channel signaling protocol and ISDN H0 and H11 channels. H0 channels are required to support AT&T's switched 384K bit/sec service, while H11 is required for switched T-1.

Most analysts don't expect other vendors to have major problems adding support for those features before high-speed switched services are readily available. Although AT&T's switched 384K bit/sec service is already available in 73 cities, switched T-1 and T-3 services won't be widely available until the second half of 1991, according to AT&T and MCI ("Carriers take diverse roads to switched data services," *NW*, Nov. 26).

"I don't think it will be a major problem because the access method is relatively straightforward," said Steve Taylor, communications systems consultant at Distributed Networking Associates, a consultancy in Greensboro, N.C.

Jeremy Frank, a vice-president at Gartner Group, Inc., a consulting company in Stamford, Conn., agreed. "I think it's going to be one of those things like fractional T-1," Frank said. "The [T-1 multiplexer] vendors who had an easy time getting together for fractional T-1 will have an easy time with switched services."

Some T-1 multiplexer makers were able to support fractional T-1 quickly because they supported carrier D4 framing formats, thus making it easy for them to bundle individual DS0 channels into fractional T-1 pipes. The same theory applies to bundling B channels into a 384K bit/sec H0 channel. An H11 channel, which is a full T-1 minus framing bits, is not a problem.

Vendors with T-1 multiplexers that support D4 framing on the trunk side include Avanti Communications Corp., General DataComm, Infotron Systems Corp., Netrix Corp. and Newbridge Networks, Inc.

For those vendors, support for PRI is only a matter of adding software that gives their switches support for Q.931; the physical interfaces stay the same.

Other vendors, such as Timeplex, Inc. and Network Equipment Technologies, Inc. (NET), must either come up with a multiplexer interface module that supports PRI or use an outboard conversion box.

For example, Teleos Communications, Inc. sells a device that makes D4-framed circuits compatible with the PRI specification. Infotron is recommending that its customers use that device to access switched services from In-

fotron multiplexers until the company develops a PRI card of its own.

In September, Timeplex announced a device called the ISDN Gateway Server that lets users attach an array of voice or data communications equipment to a PRI link. Pete Meroni, product manager at Timeplex, said the product will be tailored so it can sit in front of a Timeplex Link multiplexer to provide access to high-speed switched services. It needs only software modifications that will give it support for the ISDN H0 channels before it can be used to support AT&T's switched 384K bit/sec service, he said.

In the long term, Timeplex also plans to build an interface module for its Link multiplexers that will give them direct support for PRI links, Meroni said.

Karyn Mashima, vice-president of corporate marketing at NET, said her company has formulated a strategy to let its Integrated Digital Network Exchange T-1 multiplexers access switched services, but she declined to reveal NET's plan. She hinted, however, that the company may use an external access device such as the one provided by start-up Ascend Communications, Inc. of San Francisco.

Ascend's Multiband Bandwidth-on-Demand Controller, due out next quarter, pools multiple switched 56K, 64K or 384K bit/sec circuits into larger bandwidth pipes for use by a single data or video application, said David Helfrich, vice-president of sales and marketing for the company. The device performs synchronization at both ends to make multiple channels appear to the application as one contiguous pool of bandwidth, a process known as inverse multiplexing.

It accesses those applications via switched T-1, ISDN Basic Rate Interface or PRI links.

Berge Ayvazian, vice-president of communications research at The Yankee Group, a consultancy in Boston, said that in addition to Ascend, there are a number of vendors providing such inverse multiplexers. They include Digital Access Corp. of Reston, Va., and Integrated Network Corp. of Bridgewater, N.J.

Ayvazian said the products cost roughly between \$4,000 and \$10,000, depending on the features supported. For example, some dial multiple switched services simultaneously while others dial sequentially.

He said it is likely NET will opt for Ascend's product, although neither NET nor Ascend would confirm that.

"We are in the process of forming OEM relationships and strategic alliances with all the leading vendors" in the videoconferencing, T-1 multiplexer and local-area network bridging and routing markets, Helfrich said. "Those people are banging down our doors right now." ■

LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

“We expect multiprocessing will make sense in the future, but it’s certainly not going to be anything like a mass market phenomenon in 1991 and maybe not even in 1992.”

Gordon Smith
Product line manager
for 3Servers and 3Stations
3Com Corp.
Santa Clara, Calif.

Netnotes

Datability Software Systems, Inc. last week announced a gateway that enables users of Digital Equipment Corp. VT-220 terminals to access an IBM host computer over a Systems Network Architecture network.

Vista/3270 Cluster Controller is an interface board that plugs into Datability’s Vista Communications Server, which supports Transmission Control Protocol/Internet Protocol, DEC Local Area Transport terminal servers and X.25 links.

The VT-220 users access the Vista/3270 Cluster Controller through their existing connections into the Vista, with the gateway establishing the host sessions.

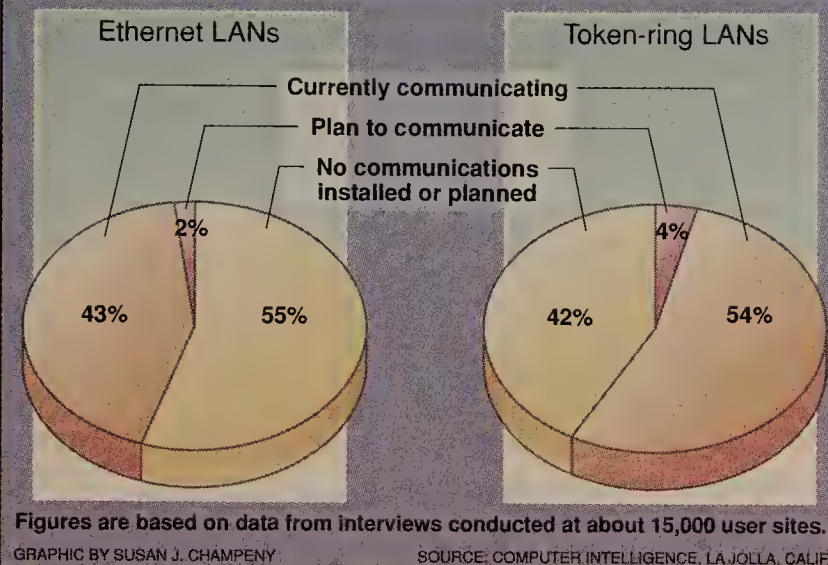
The card, which emulates a 3X74 cluster controller, also provides a direct physical connection to an IBM 37X5 front-end processor via a synchronous communications line.

Vista/3270 Cluster Controller is expected to be available in February for \$4,999.

For more information, contact Datability at 322 Eighth Ave., New York, N.Y. 10001, or call (212) 807-7800.

Madge Networks, Ltd. recently announced it has licensed its Fastmac data buffering and transfer program to **Cisco Systems, Inc.**, which will use the software to boost the performance of its inter-networking products. Madge Networks says its Fastmac
(continued on page 22)

LAN-to-host link plans



UB to unveil OS/2 network control for Access/One hub

Offers more features than DOS-based system.

By Tom Smith
Senior Writer

SANTA CLARA, Calif. — Ungermann-Bass, Inc. is scheduled to introduce today an OS/2-based network management system for its Access/One intelligent wiring hub that is more powerful than the company’s existing DOS-based system.

The product, NetDirector, performs physical-layer management of all Ungermann-Bass devices in the network that have an agent supporting Courier, the net management protocol for Xerox Corp.’s Xerox Network Systems.

Ungermann-Bass plans to add support for the Simple Network Management Protocol (SNMP) in 1991 and the Open Systems Interconnection/Common Management Information Protocol at an unspecified date.

The company already offers an SNMP agent on its Access/One Supervisor Module, a board that resides in the hub. But that agent cannot be managed from Ungermann-Bass’ current DOS-based net management system, which will be phased out over time.

Although Courier is an agent that is unique to devices supporting the XNS protocol, it can also be used on networks that run the Transmission Control Protocol/Internet Protocol, provided that each managed device has a Courier agent.

The Access/One hub is offered in five- and 11-slot configurations and supports a range of interfaces, including a variety of Ethernet boards, 4M bit/sec token-ring boards, as well as bridge and terminal server boards.

NetDirector software runs on any Intel Corp. 80386-based local-area network server running OS/2 1.2 or higher. Because the

software is based on a client/server architecture, it enables net managers to perform management tasks from any client across the network.

NetDirector software ships with a base version of Microsoft Corp.’s LAN Manager net operating system, but it can be used to manage other servers running Ungermann-Bass’ Net/One LAN Manager or other vendors’ net operating systems.

The product has an embedded Microsoft/Sybase, Inc. SQL Server data base engine, which was not offered on Ungermann-Bass’ DOS-based system. It also has an Ungermann-Bass-developed front end that enables users to

The product has an embedded Microsoft/Sybase SQL Server data base engine.

▲▲▲

generate reports or run other applications that would utilize information stored in the SQL data base. Support for SQL will let Ungermann-Bass users run off-the-shelf SQL front ends when they become commonly available.

“Our users have been very clear that they want to use the information in unique ways,” said Roger Bertmann, vice-president of marketing at Ungermann-Bass. “We don’t want them to have to write to unique [application program interfaces] or have to depend on our applications.”
(continued on page 22)

IEEE panel resolves glitch with bridging

Vendors correct problem affecting AppleTalk when passing through Ethernet-to-FDDI bridges.

By Tom Smith
Senior Writer

Members of the IEEE committee on LAN bridging recently agreed on a technique to prevent improper translations that had been occurring when bridges were used to connect Apple Computer, Inc. AppleTalk-based Ethernet networks over an FDDI backbone.

The problem came to light when Digital Equipment Corp. customers learned that the company’s Ethernet-to-Fiber Distributed Data Interface translating bridges were incorrectly translating AppleTalk Phase II packets to AppleTalk Phase I packets when attempting to connect two Phase II local-area networks over an FDDI network, DEC said. Translating bridges are used to link Ethernets over FDDI backbones. They translate Ethernet packets into FDDI-compatible packets for transport over the FDDI net.

The two Ethernet versions of AppleTalk — EtherTalk Phase I and EtherTalk Phase II — are based on different Ethernet implementations: Phase I is based on the original Type 2 Ethernet specification, while Phase II is based on the IEEE 802.3 standard.

The 802.3 standard uses the IEEE 802.2 standard packet format, as do 802.5 token-ring and FDDI LANs.

LANs that are 802.2 compatible use a 5-byte protocol identifier field, while Type 2 Ethernet uses a 2-byte type field, which is unique to Type 2 packets, to identify the protocol, according to Floyd Backes, principal engineer in the telecommunications and network architecture group at DEC.

Based on work by the IEEE 802.1B bridging committee, vendors of translating Ethernet-to-
(continued on page 22)

ODS introduces pair of RISC-based E-net bridges

RICHARDSON, Texas — Optical Data Systems, Inc. (ODS) recently introduced local Ethernet bridges that are based on two Reduced Instruction Set Computing (RISC) microprocessors.

The bridges, each of which supports two Ethernet connections, are the ODS 2009 and the ODS 2010, which support 512 and 4,096 end-user addresses, respectively.

Both bridges are offered in compact stand-alone versions or as interface boards for use in the company’s ODS 290 line of intelligent wiring concentrators.

When installed in the 290 concentrator, the 2009 and 2010 can connect two segments supported by a single chassis. Alternatively, they can link one Ethernet local-area network supported by the chassis to an external Ethernet, such as an Ethernet backbone, according to Jerry Pate, vice-president of engineering at ODS.

Both bridges support fiber-optic cable, 10BaseT, as well as thick and thin Ethernet LANs.

Optimal performance

Based on two Harris Corp. Semiconductor Products Division RISC processors, the bridges are

designed to provide optimal performance and throughput, particularly when new CPU-intensive features such as data filters are added to forthcoming software releases.

In addition, the bridges use several Advanced Micro Devices, Inc. chips to perform address table lookups, Pate said.

STP, SNMP support

Future software releases for the 2009 and 2010 will include support for the Spanning Tree Protocol and a Simple Network Management Protocol (SNMP) agent. The SNMP software will enable the bridges to be managed from SNMP-compliant management stations made by ODS or other vendors.

LED bar graphs on the front panel of the bridges monitor traffic levels and display the packet forwarding rate for each LAN supported by the bridge.

The ODS 2009 and ODS 2010 cost \$3,650 and \$4,550, respectively. Both products are available now.

For more information, contact ODS at 1101 E. Arapaho Road, Richardson, Texas 75081, or call (214) 234-6400. □

UB to unveil OS/2 net control for hub

continued from page 21

The SQL data base functions as a central repository for all network information, including user-defined extensions, configuration and topological data.

The product also supports the OS/2 Presentation Manager graphical user interface and the Named Pipes interprocess communications facility. Named Pipes is used for communications between the server running NetDirector and any other workstation on a LAN from which net managers are executing management tasks.

Physical-layer management tasks supported by the product include monitoring connectivity, packets received and trans-

mitted, as well as setting thresholds and alarms when those limits are exceeded.

In the second quarter of 1991, Ungermann-Bass will add a topological map that is automatically drawn from information in the SQL data base. That map will support SNMP for communications with the data base. It will later be enhanced to automatically discover additions to the network, for example. Future SNMP enhancements will include support for SNMP in existing net management applications that are part of NetDirector, including an event log and a performance manager that will enable users to retrieve any variable contained in an SNMP Management Information Base.

The initial release of NetDirector is expected to be available in January, with prices ranging from \$7,500 to \$16,000. **■**

IEEE panel resolves glitch with bridging

continued from page 21

FDDI bridges, including DEC, tried to accommodate Type 2 Ethernets by inserting the Ethernet Type 2 field into the 802.3 protocol identifier field and inserting six zeros into the remaining three bytes.

Those zeros, which were put into a portion of the protocol identifier field known as the organizationally unique identifier, indicate to the receiving bridge that the packet contains Ethernet Type 2 data that should be translated back to its original format.

Apple, however, had already been using all zeros in AppleTalk Phase II's organizationally unique identifier, said Alan Oppenheimer, network engineering architect

at Apple and a participant in the 802.1B meetings. Consequently, AppleTalk Phase II packets would be translated to AppleTalk Phase I packets when passing through translating bridges, although the eventual recipient of the data was not an AppleTalk Phase I node or segment.

"The problem is in AppleTalk's address resolution protocol," Oppenheimer said. "Nodes on one side of FDDI could not even find nodes on the other side to begin to talk to them, so the nodes were sort of isolated from one another."

AppleTalk Phase I and Phase II nodes or segments can only communicate through a router, Oppenheimer said, because routers transfer data based on specific protocols, as opposed to the protocol-independent data transfers supported by bridges.

Oppenheimer said AppleTalk is the only major LAN protocol he is aware of that has experienced this problem.

Both DEC and Apple said they discovered the problem through their customers and acted swiftly to correct it.

"Some of our customers made us and Apple aware of this problem," said Karl Pieper, FDDI group marketing manager at DEC. "We worked with other bridge vendors to come up with a fix."

Vendors participating in the IEEE 802.1B LAN bridging committee recently agreed to implement a solution that will eliminate the problem, Pieper said.

A table in each bridge will assure that 802.3 packets pass through the bridge unchanged. Meanwhile, any packet received that has a new organizationally unique identifier agreed to by the committee as a flag for Type 2 packets will be translated back to Type 2. That new number, which DEC has made available to the vendor community, is 0000F8.

"This will either be an IEEE standard or an IEEE recommended practice," Apple's Oppenheimer said. "But, in fact, it would be the same thing." **■**

Multi-vendor connectivity for only \$15

EXPLORE bold new networking technologies



**COMMUNICATION
NETWORKS**
CONFERENCE & EXPOSITION

January 28-31, 1991

Washington Convention Center • Washington, D.C.

Make the right connections to meet your everyday networking challenges at **Communication Networks '91** – the industry's leading international exposition. Whether you take one, two or three days to attend, you'll return to your office with the information you need to build and manage better, faster and more complex networks.

- Meet over 400 Exhibitors with the latest generation of communications hardware and software
- Find products for emerging standards – FDDI, X.400, TCP/IP, OSI, GOSIP
- Learn new and proven solutions – client servers, networked databases, private network services, testing and analysis, security ... and more
- Discover the exciting world of ISDN in a special Exhibit Hall at Ramada Renaissance Techworld
- Choose from over 70 dynamic conference sessions with industry experts and 15 intensive, full-day tutorials to bring you up to speed. **(Separate registration required for Conference, call 1-800-225-4698 today!)**
- And much more!

Act now – save \$15.

Exhibit Hall admission is only \$15 when you mail the coupon below along with payment before December 21. Avoid waiting in long lines at the Show. Registration without this coupon is \$30.

Advance Registration Form

Sections A – E must be completed to process your registration.

A. Please Type or Print Clearly

Name _____ Title _____
Company _____
Address _____
City _____ State _____ Zip _____
Telephone (_____) _____

B. Your Business or Profession (Circle One)

1. Manufacturing
2. Retailing
3. Wholesaling/Distribution
4. Insurance/Banking/Financial
5. Professional/Service
6. Education
7. Health Care
8. Government
9. Communication Carriers
10. Voice Communications Equipment
11. Computer Equipment
12. Datacom Equipment
13. Information Service

14. Consultant

15. Software

16. Other (Specify) _____

C. Your Job Title/Function (Circle One)

Communications users:

1. General Management
2. Marketing/Sales
3. Production/Operations
4. Telecom Management (Voice/Data)
5. Voice Communications Management Only

Return Registration Form with \$15 payment before December 21, to:

Communication Networks, P.O. Box 9107, Framingham, MA 01701-9107.

6. Data Communications Management Only

7. Network Systems Analyst/Planner
8. EDP System/Program/Planning
9. Office/Automation Systems Management

Communications manufacturers/vendors:

10. General Management
11. Marketing/Sales
12. Hardware Manufacturing & Development
13. Software Development
14. Engineering
15. Consultant
16. Other (Specify) _____

D. Size of Your Organization (Circle One)

1. Under 100
2. 100-499
3. 500-999
4. 1,000-4,999
5. Over 5,000

E. What is your role in the purchasing process of communications equipment and services? (Circle One)

1. Final Decision Maker
2. Recommend
3. Specify
4. No role

No one under 18 admitted. This form may be duplicated.

Netnotes

continued from page 21

software for token-ring interface boards improves the performance of Texas Instruments, Inc.'s token-ring chipset by 400%.

Promptus Communications, Inc. recently announced that its T-1 LanRouter has successfully completed testing under Novell, Inc.'s Independent Manufacturers Support Program and is now certified as a NetWare-compatible product. The Promptus T-1 LanRouter is a data service unit/channel service unit that plugs into an IBM Personal Computer AT and allows NetWare users to link directly to a T-1 trunk.

Contact Promptus at Portsmouth Business Park, Portsmouth, R.I. 02871; (401) 683-6100.

Gateway Communications, Inc. recently introduced a transceiver that enables Ethernet users to connect coaxial local-area network nodes to nets based on 10BaseT unshielded twisted-pair wire.

The G/EtherTwist Transceiver allows thick or thin Ethernet adapters, repeaters and other hardware devices to connect to a 10BaseT network. The transceiver costs \$150 and is available now.

Gateway can be reached by writing to 2941 Alton Ave., Irvine, Calif. 92714, or by calling (714) 553-1555. **■**

MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USER GROUPS AND ASSOCIATIONS

Worth Noting

“Be careful of putting fourth-generation technology into a second-generation organization.”

Charles Savage
Organizational consultant
Digital Equipment Corp.
Maynard, Mass.

Reducing the risk of computer crimes

1. **Physical security:** Locks and encloses computers, data and information processing sites.
2. **Procedural security:** Establishes managerial controls and evaluations of information processing and access controls.
3. **Logical security:** Comprises hardware or software features that control who uses computer resources and determine what an authorized user may do.
4. **Network security:** Controls access to and uses of network facilities.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: LAFFERTY PUBLICATIONS, LTD., LONDON

Security lagging behind technology, report finds

As corporate nets grow, so do security problems.

By Maureen Molloy
Staff Writer

The incidence of computer-related crime continues to climb, fueled in large measure by the rapid expansion of corporate networks, according to a recently released report.

The report, “Information Security in Financial Institutions: How to Reduce the Risk of Computer Crime,” says information systems (IS) executives must pay more attention to security in deploying networks that link personal computers, hosts and other processing resources.

Criminologist and information security expert Sanford Sherizen, who wrote the report, describes computer crime as the white collar crime of the decade and reports that it costs companies billions of dollars annually, both in actual losses and in money expended on security systems.

But Sherizen says security at most companies hasn’t kept pace with rapid technological change, particularly in the networking area. Most security is still at the “lock on the door” level, Sherizen said.

“The protection of sensitive information requires active managerial responses rather than solely technical responses,” he said. “Computer and virus protections will require [managers] to strategically coordinate the processing and protection of information.”

One reason security has received inadequate attention is because it’s often viewed as a cost that isn’t balanced by any tangible gain to a company. Though IS professionals implement security tools, the ultimate success of any security system depends on con-

vincing senior management and other users of the importance of protecting information.

“Information on how to commit computer crimes is easy to obtain from electronic bulletin boards, computer hobby clubs and magazine articles,” he said. “Many networks are structured in such a way that legitimate users and criminals can move from system to system with relative ease.”

Sherizen recommends adopting an early warning system through which a company reviews the security implications of

“The protection of sensitive information requires active managerial responses rather than solely technical responses.”

▲▲▲

evolving technologies. Periodically, as well as during times when applications are being developed, purchased or expanded, a security impact report should be written for senior management that outlines how the applications affect and are affected by security controls.

The report should provide recommendations on how to integrate technological advances while maintaining or strengthening information security.

The following are guidelines
(continued on page 25)

IS managers at S&Ls facing budget woes

Savings and loan crisis puts pressure on network executives to cut costs and do more with less.

By Wayne Eckerson
Senior Editor

For network and data processing managers at savings and loan institutions throughout the U.S., cost cutting has taken on a new importance.

Paring large budget items such as information systems (IS) expenditures has become a matter of survival for many S&Ls that are being squeezed by bad real estate loans, higher capitalization ratios and insurance fees, and sagging consumer confidence.

To reduce expenses, network and IS managers are focusing on short-term projects providing immediate payback and are rebidding contracts to get lower prices. They are also making extensive use of the third-party market for used and leased equipment, among other things.

The stakes are high. Before the S&L crisis took hold several years ago, there were more than 4,000 S&Ls nationwide. But today, there are about 2,500, said Arthur Hooper, senior vice-president of John Hanson Savings & Loan, Inc. in Beltsville, Md.

Of the 2,500 S&Ls remaining,

1,000 are well-capitalized, 1,000 are thinly capitalized, and 500 have no capital and risk being taken over by Resolution Trust Corp. (RTC), the federal agency responsible for cleaning up the S&L situation, Hooper said.

“I’ve been in the business 30 years, and it’s much tougher now than it’s ever been,” Hooper said. The S&L crisis “has put us in a survival mode where you don’t think or plan beyond the next quarter or year.”

Four years ago, Hooper said, his division had 60 employees and an annual budget of more than \$3 million. Today, he manages the same division with 30 people and a \$2 million budget.

Hooper said he has managed to reduce costs, thanks to a major network overhaul the bank completed three years ago, before money became tight. That project, which involved building a redundant, mesh data network to serve 15 branch offices and several other facilities, is saving the bank \$60,000 a year in data communications costs.

However, Hooper is now fo-
(continued on page 25)

EXECUTIVE BRIEFS

BY WAYNE ECKERSON

Desire for dress code linked to satisfaction.

According to a recent nationwide survey, there is a correlation between employees’ job satisfaction and whether they feel that a dress code is important at work.

Sponsored by Ricoh Company, Ltd., the poll of 500 office workers throughout the U.S. found that 46% of workers who are satisfied with their jobs said they think a dress code is very important. Of the workers who are less satisfied with their jobs, only 32% said a dress code is very important in the workplace.

The survey also showed that workers on the East Coast are more likely to support dress codes than their counterparts on the West Coast, and women favor dress codes at work more often than men do.

In addition, people who work for companies with fewer than seven employees are more likely to endorse a dress code than workers at large companies.

Positive marks for telecommuting. While few firms have telecommuting policies, those that do say their programs have been successful.

A recent survey of about 1,000 human resources managers showed that only 7% of companies permit employees to work at home. Of those firms, the majority report that telecommuting has improved both productivity and employee morale.

In addition, about one-third of the respondents said telecom-
(continued on page 25)

Association Watch

The **European UNIX Users Group** has announced it has changed its name to **EurOpen**, a move that reflects the group’s increasing commitment to the development of open systems, according to group officials.

EurOpen is a federation of 20 national Unix and open systems groups from Europe. It provides members with publications, conferences, software distributions and reports on open systems standards, among other things. EurOpen members include Austria, Belgium, France, Germany and the U.K.

The **North American ISDN Users’ Forum** will hold one of its triannual meetings from Feb. 26 to March 1 at the Town & Country Hotel in San Diego. The forum, which is sponsored by the National Institute of Standards and Technology, will include dozens of sessions and workshops about the protocols associated with Integrated Services Digital Network. Registration costs \$257. For more information, call Dawn Hoffman at (301) 975-2937.

In addition, **Communications Connections ’91**, the first exposition and conference devoted to telecommuting, will be held at the Town & Country from Feb. 25 to 27. With the theme “Telecommuting — Beating Traffic and the Competition,” the conference will host more than 120 speakers addressing topics associated with telecommuting.

For more information, call (415) 637-2300. ■

FAXNeT is a service designed to help readers of *Network World* gather important information via FAX on products and services advertised in *Network World*.

How to Use FAXNeT

Listed below in the FAXNeT Directory are the FAX numbers of participating advertisers in this week's issue of *Network World* and the page number where the ad appears. To use FAXNeT cut out the FAXNeT form and make a copy of the form for each inquiry you want to make. Then just FAX it to the vendor's number listed in the FAXNeT Directory.

Benefits to the *Network World* Reader

FAXNeT is designed to get you product and service information FAST. And, if your request is urgent and requires an immediate response from the vendor just check the "Urgent" Box.



NETWORK WORLD

FAXNeT

Attention: Marketing Communications Manager

Subject: This inquiry was generated by a *Network World* reader who is responding via FAX to your advertisement in *Network World*.

Name

Title

Company/Div

Address

City

State

Zip

Phone

FAX

☐ URGENT

Action Requested

☐ Request for Sales Call

☐ Request for Proposal

☐ Request for Information

Scope of Purchase Responsibility

☐ Enterprise Wide

☐ Departmental

Purchase Timeframe

☐ Within 60 Days

☐ Within Six Months

☐ Within One Year

Purchase Influence/Number of Sites

☐ One Site

☐ 2-9 Sites

☐ 10-20 Sites

☐ 21+ Sites

Product

Advertised:

Intended

Application:

This week's FAXNeT ADVERTISERS

Company	Page
Advanced Relay	47
Fax: 503-484-0216	
AT&T Paradyne	10-11
Fax: 813-530-2103	
Banyan	64
Fax: 508-898-1755	
Bell South	55
Fax: 404-876-9575	
BT Tymnet	12
Fax: 408-922-8015	
Digicom	16
Fax: 408-262-1390	
Tel. Training Monthly	47
Fax: 215-598-7690	
Teletutor	47
Fax: 603-433-2260	
UniForum	47
Fax: 708-299-1349	
US Sprint	3, 18-19
Fax: 703-689-6998	
WorldCom	27
Fax: 212-607-2274	
World Expo Corp	22
Fax: 508-872-8237	

Now the
link between
AT&T 800 Service
and your business
is even stronger.

AT&T completes the 800 call completion chain, Egress.

Now virtually nothing can stop 800 calls from getting to you. Because Egress, the link between you and our Network, has been made virtually indestructible. Thanks to some of the most innovative software anywhere and our exclusive 800 Assurance Policy.

This critical link has been strengthened by two new automatic routing features that instantly redirect incoming calls around problems on a call-by-call basis. The first, Split Access Flexible Egress Routing (SAFER),* automatically reroutes calls to your location if your primary route is ever down.

The second, Alternate Destination Call Redirection (ADCR),* reroutes calls to a different location, across town or across the country. In case of service disruption, both options virtually guarantee call completion.

If you prefer more hands-on con-

trol, we have 800 Routing Control Service. From your own network terminal, you can react in real-time to changing traffic patterns, adapt to regional promotions, and cover emergencies or closings. There's also 800 Command Routing Service that, once you call us, redirects calls to a preprogrammed alternative route within 5 minutes.

The fact is, we're so committed to reliability, we guarantee it with the AT&T 800 Assurance Policy. Every domestic AT&T 800 customer is automatically covered.**

Now the company with more ways to get every 800 call through offers you more security than ever.

*800 calls that get through.
Another AT&T advantage.*

For more details, call your AT&T Account Executive.



AT&T

The right choice.

US Sprint offers speedy medical image transport

Option priced in line with long-distance costs.

By Maureen Molloy
Staff Writer

CHICAGO — US Sprint Communications Co. recently introduced a service that allows physicians to use dial-up digital links to transmit medical images for the first time over a long-distance telephone line.

The Healthcare Application Network Delivery System (HANDS), introduced at the Radiology Society of North America conference here, enables physicians to transmit diagnostic images such as CAT scans, magnetic resonance images (MRI), X-rays and sonograms from one hospital clinic to another in seconds. HANDS, based on US Sprint's 56K service, enables users to create links of varying bandwidth on an as-needed basis by making it possible to establish one to 24 parallel dial-up 56K bit/sec channels between two locations. Customers only pay for the bandwidth required for each applica-

According to US Sprint, it will cost about \$1.50 to send a single X-ray over the network.

The application "represents a real breakthrough for our discipline," said Dr. Arch Templeton, chairman of diagnostic radiology at the University of Kansas Medical Center in Kansas City, where HANDS has been field-tested. "It allows leading radiologists in one location to offer rapid diagnostic services across city and state boundaries."

Templeton said HANDS is especially useful for rural and military hospitals that have traditionally experienced a dearth of on-site radiologists to analyze medical images.

"There's a real shortage of radiology specialists today, especially outside the country's major cities. So this service, in essence, provides better quality patient care by letting you dial up an expert for an immediate diagnosis," Templeton said.

HANDS also lets customers ac-

cess the worldwide Sprint Meeting Channel videoconferencing network, enabling health care professionals to meet face-to-face electronically. It can be implemented within operating rooms, for example, to allow surgeons to converse with peers in remote locations.

Dr. James Lear, chief of nuclear medicine at the University of

Colorado Health Sciences Center in Denver, which beta-tested the application during the last eight months, said that because the service is all-digital, he can count on high-quality transmission. "I can't afford a bad connection when I'm traveling and need to supervise my department electronically," he said. "This is a service I'm nearly 100% confident I can count on."

SunHealth, the nation's third largest health care alliance comprising more than 700 hospitals, physicians' groups and extended care programs, has signed a

three-year agreement with US Sprint for access to the HANDS package.

ical Systems, Fuji Photo Film, Inc. and General Electric Co.'s GE Medical Systems of Milwaukee. "Kodak and Vortech came into the PACS market at just the right time because they can exploit the great strides made in image technology over the last 18 months at a much lower cost," Rushing said.

In addition to cost-effectiveness, Rushing said users may favor the Ektascan Imagelink over competing PACS because of its open architecture and modularity.

Ektascan Imagelink can link multiple imaging modalities such

This service, in essence, provides better quality patient care by letting you dial up an expert for an immediate diagnosis," said the University of Kansas Medical Center's Arch Templeton.

▲▲▲

as MRI, computed tomography, computed radiography and film digitizers, with multiple output devices such as laser printers, optical disk archives and high-resolution CRT monitors. The images can be transmitted electronically within the hospital or across the country.

Low-cost PACS

Also unveiled at the conference was a picture archiving and communications system (PACS) that lets radiologists digitize, store, send and print medical images.

The new system, developed jointly by Eastman Kodak Co. and Vortech, Inc., a medical imaging concern, is less expensive and has higher resolution than similar technology on the market today, according to Steve Rushing, an Andersen Consulting partner who heads the firm's national health care systems integration practice.

Ektascan Imagelink costs between \$100,000 and \$500,000, while other PACSs typically cost at least \$1 million each. Competitors in the field include the joint venture of AT&T and Philips Med-

ical Systems, Fuji Photo Film, Inc. and General Electric Co.'s GE Medical Systems of Milwaukee. "Kodak and Vortech came into the PACS market at just the right time because they can exploit the great strides made in image technology over the last 18 months at a much lower cost," Rushing said.

The Kodak/Vortech system reportedly will work with any customer's existing network equipment.

The open architecture also protects ongoing investments by helping the customer keep pace with developments.

Rushing said the system's modularity allows health care facilities to begin with a relatively modest investment and add capability incrementally.

"Typically, it's been hard for all but the largest hospitals to justify the cost of a PACS, but this system's cost and modularity make it affordable to small and midsize hospitals," he said. ▀

Executive Briefs

continued from page 23

muting has enabled their companies to improve employee retention while also reducing office expenses.

The survey was conducted by Adia Personnel Services, a temporary and full-time employment service based in Menlo Park, Calif.

Fewer than 10% of all employees at companies that offer telecommuting take advantage of the program. Many companies offer telecommuting as a temporary solution to special situations such as a sick child, according to the survey.

A majority of companies that are currently offering telecommuting programs are in the high-technology industry, the survey said. ▀

Security behind technology

continued from page 23

Sherizen outlined for designing effective information security controls.

■ **Consider security from the start.** Network projects should be evaluated for their security impact at the design stage. Controls built into the system at a later stage are often less effective and more costly.

■ **Anticipate future security requirements.** Establish a control philosophy that guides network development and covers security options to be incorporated at a later date. Flexibility in future systems development enables users to maintain and improve security.

■ **Minimize and isolate security controls.** To achieve a high degree of confidence, network designers should minimize the size and complexity of the security systems.

■ **Enforce least privilege.** Users should not be given computer and network privileges — such as access to programs, data or processing functions — than are absolutely necessary for them to do their jobs.

Privileges should be enforced through hardware and software restrictions as well as by procedural decisions that define a user's level of access.

■ **Make security friendly.** Security mechanisms should be designed so that they don't affect users who obey rules. In other words, make security transparent to legitimate users.

■ **Don't depend on secrecy for security.** It's dangerous to assume that unauthorized users won't be able to access a system because they don't know about it or can't obtain information about how it works.

For further information about the report, contact Lafferty Publications, Ltd., The Tower, IDA Centre, Pearse St., Dublin 2, Ireland; or call 353-2-718022. ▀

IS crisis challenges IS

continued from page 23

ing on IS projects with pay- of a year or less. One exam- is an optical disk that stores outer output, which will save ank about \$4,000 a month in ing and paper costs. With an l cost of about \$35,000, the ill enable the bank to break on the investment in less a year.

etwork and IS managers at s where the RTC has taken ave not fared as well. These agers say they are not al- d to spend money without TC's approval.

We've essentially been main- ing the status quo since the ame in," said Ron McLean, processing manager at At- Permanent Federal Savings

Bank, F.S.B. in Chesapeake, Va. The RTC has been managing Atlantic Permanent for a year.

The DP department cannot fill vacated staff positions, and it no longer has the funds to send staff members to conferences or educational seminars. Also, the department has dropped from 200 to 120 people since the RTC took over, McLean said.

Jim Goodwin, manager of IS at Heritage Federal Savings Bank in Richmond, Va., said he thinks he'll hold onto his job until the bank is sold by RTC, which took over operations last month. After that, he said he hopes to be offered a job by the new owners.

Goodwin said he has saved the bank well over \$350,000 in the past five years by aggressively bidding for equipment on the third-party market. He also expects to save money by reevaluat-

ing all equipment maintenance contracts and doing more maintenance in-house.

While RTC-operated S&Ls are making due with tight budgets, even S&Ls that are well-capitalized are under pressure to cut costs.

The negative publicity surrounding the crisis and higher insurance fees for customer accounts makes it more difficult to turn a profit, said Kevin Bryant, vice-president in charge of IS at Pioneer Federal Savings Bank in Chester, Va. Unlike less capitalized banks, Pioneer is willing to allocate funds for major IS projects that will increase productivity and performance in the long run, Bryant said.

In his department, Bryant has reduced by 50% the cost of vendor-supplied maintenance and other services by putting all exist-

ing contracts out for competitive bid.

In other areas, the bank is planning to spend \$750,000 to replace dumb terminals in its 12 branch offices with personal computer-based local-area networks, Bryant said.

The new network architecture will help branches provide better customer service and win new business, Bryant said. The network will support software that will enable salespeople to handle a greater number of transactions and prompt them with information gleaned from a customer data base. That is expected to help them cross-sell more accounts.

In addition, the network will enable the marketing department to monitor the progress of sales campaigns and the productivity of salespeople, he said. ▀

FIND YOUR NEXT SALE IN ITI'S UNIVERSE



There are hundreds of thousands of computer end-user sites in the United States. If that's your universe of potential customers, finding your next sale may feel like looking for a needle in a haystack.

Unless you start with Installed Technology International (ITI).

Our part of the universe is ITI's database of U.S. computer sites. We give you all the information you need to accurately identify your best prospects.

Even if you're using another source, you can't get the entire universe from any one supplier.

ITI clients tell us there's only 25% duplication between our database and our closest competitor's. And on those sites that do overlap, you'll find that ITI gives you fresher information including new or different prospect names.

Reach the person who wants to purchase your product! Here's how the information ITI collects will show you how to zero in on just the right prospects.

- **Spend less time looking for the right prospects and more time selling to them!** ITI gives you: prospect names & titles — 274,917 key MIS/DP & general management contacts.

- **Mail and telemarket only to those prospects who need your product!** ITI gives you: installed hardware and software by vendor and model, plus future buying plans — so you'll know if your product is a good fit.

- **The more you know about your prospects, the easier it is to aim your sales pitch directly at their needs.** ITI gives you: company size, industry verticals, and corporate affiliations.

ITI also gives you 63,000 sites in Europe, Canada and Asia. So when you're planning your sales and marketing programs, plan on adding ITI to your mix.

Call Jan Kenz for a FREE brochure.

1-800-347-3484

INSTALLED TECHNOLOGY INTERNATIONAL

ITI is a sister company to *Network World*, and part of International Data Group's (IDG) worldwide family of publication, research and exposition companies.

INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

World News

US Sprint Communications Co. last week said it has extended its Global Virtual Private Network (VPN) services into the Netherlands and Canada. The carrier said it has signed up PTT Telecom Netherlands to market Global VPN in that country, making the firm the first supplier of the service in Europe. PTT Telecom Netherlands is a privatized provider of terminal equipment and value-added services.

In Canada, US Sprint has recruited Teleglobe Canada and Unitel Communications, Inc. to market Global VPN to their customers. A US Sprint spokesman said other Canadian carriers may eventually sign up to market Global VPN.

Prodemge, a Brazilian provider of data processing services to state-run companies, recently said it is planning to bring a new 360-node very small aperture terminal network on-line this month to improve communications between its data center and customer sites.

AT&T Tridom teamed up with a Brazilian communications company to build the satellite network for Prodemge. The company will use the network of 360 VSAT terminals to improve telecommunications between its headquarters in Belo Horizonte, Brazil, and hundreds of state-run companies such as banks and health organizations.

Villares Control, a San Paolo, Brazil, firm, will provide marketing and maintenance. AT&T Tridom will provide the VSAT equipment. ■

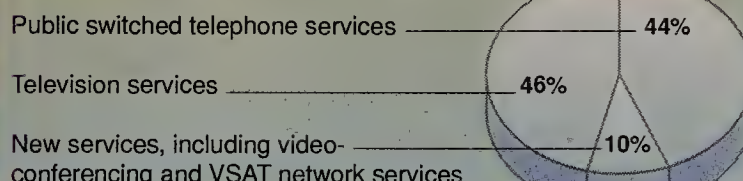
Summing up Europe's satellite services

Satellites serving Europe in 1990: 32
Transponders serving Europe in 1990: 350
Transponders supporting network services: 150

Increase in satellite capacity expected, 1990-1993: 215 %
Increase in number of satellites expected, 1990-1993: 175 %

Earth stations supporting one-way services in 1989 (not including television): 9,000
Earth stations supporting two-way services in 1989: 400

Revenue from satellite services in 1989:
440 million European Currency Units (\$612 million U.S.)



GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: EUROPEAN COMMISSION, BRUSSELS, BELGIUM

Number of issues stand to sidetrack int'l net projects

PTTs, regulations and standards affect net plans.

First of two parts.

By Cory Van Wolvelaere
Special to Network World

Strategists are fond of pointing out that deregulation and standardization will make creating an international network slightly more difficult than hooking up a videocassette recorder.

ANALYSIS

Unfortunately, the truth is that building an international network is still much more difficult than building a domestic network, as I can attest from my involvement in creating our firm's own international network, AANet, as well as international nets for clients.

Consequently, a well-thought-

Van Wolvelaere is a partner in the telecommunications practice of Andersen Consulting.

out development plan with an experienced international project team is still essential for a successful implementation. The areas: working with post, tele-challenges stem mainly from four graph and telephone administrations, overcoming regulatory hurdles, maintaining the network and overcoming nonstandard standards.

Working with PTTs can be much more challenging than dealing with U.S. carriers. PTTs are generally not market-driven, making them much less responsive to requests for information and service. Rather than having AT&T, for example, bending over backward to show what it could do for us, we had to go to the PTTs and prove to them that they could provide what we needed.

The PTTs also proved more restrictive than U.S.-based carriers. Some wanted a minimum one-year commitment, compared to

(continued on page 30)

Radio giant 'bridges' int'l network centers

Radio Free Europe installs high-speed lines, data compression bridges to link data center LANs.

By Maureen Molloy
Staff Writer

WASHINGTON, D.C. — Network managers at Radio Free Europe/Radio Liberty, Inc. (RFE/RL) last week said the news organization has weeded out numerous low-speed leased lines in favor of fewer high-speed circuits that link local-area networks at data centers here and in Munich, Germany.

The migration to fractional T-1 circuits will enable the company to cut its wide-area transmission costs in half while also providing redundant routing to protect against line failures.

In addition, by installing data compression bridges that link LANs at the data centers, RFE/RL network managers said they can free up bandwidth on the network so voice traffic can piggyback onto data circuits, thereby reducing voice-grade line costs.

"It became evident that we had to get rid of the spaghetti network by consolidating all our costly lines," said Robert De Toro, director of network services for RFE/RL.

RFE/RL, which is funded by the U.S. government, broadcasts news and information in 23 languages to the countries of Eastern Europe, the Baltic states, the Soviet Union and Afghanistan.

Previously, RFE/RL used 142 point-to-point leased lines to connect LANs at bureaus spread across Europe to the data centers in Germany and Washington.

RFE/RL has 30 news agencies across Europe, with LANs supporting nearly 1,300 local and remote users on Digital Equipment Corp. VAXclusters.

Users at a remote news bureau

previously established leased-line connections to the Munich data center or to another news bureau.

But in 1987, the company launched a massive campaign to route all traffic through the data centers and eliminate the reliance on point-to-point lines.

Under the new setup, bureaus access the Munich data center via dial-up connections on public packet networks. Two data sites in Munich — one at Englischer Garten and another at Kusterman Park — as well as RFE/RL's Washington data center, are each equipped with a Microcom, Inc. LAN Bridge (MLB).

“We had to get rid of the spaghetti network by consolidating all our costly lines.”

▲▲▲

The two Munich sites exchange data via two European T-1 lines — of which the company uses only 1.024M bit/sec and 512K bit/sec of available bandwidth — while traffic between Englischer Garten and Washington runs over a 128K bit/sec line and a satellite link also supporting 128K bit/sec speeds.

The company also installed three MLBs at each site to compress data for transmission over the high-speed circuits.

“That move alone has let us

(continued on page 30)

What it takes to be the international specialist.

#1 in a series.



“Overseas facilities management centers.”

—Peter Moebius,
VP—Europe & Africa
World Communications, Inc.

More and more telecom managers are turning to facilities management centers as the ideal way to establish an efficient global network in the face of rising equipment housing and maintenance costs.

To fill this growing need, we at WorldCom have opened our first overseas facilities management centers. Located in London and Frankfurt, these state-of-the-art complexes offer

primary and backup access from the national carriers and can serve as the hub for all of your telecommunications within the U.K., Germany and throughout Europe.

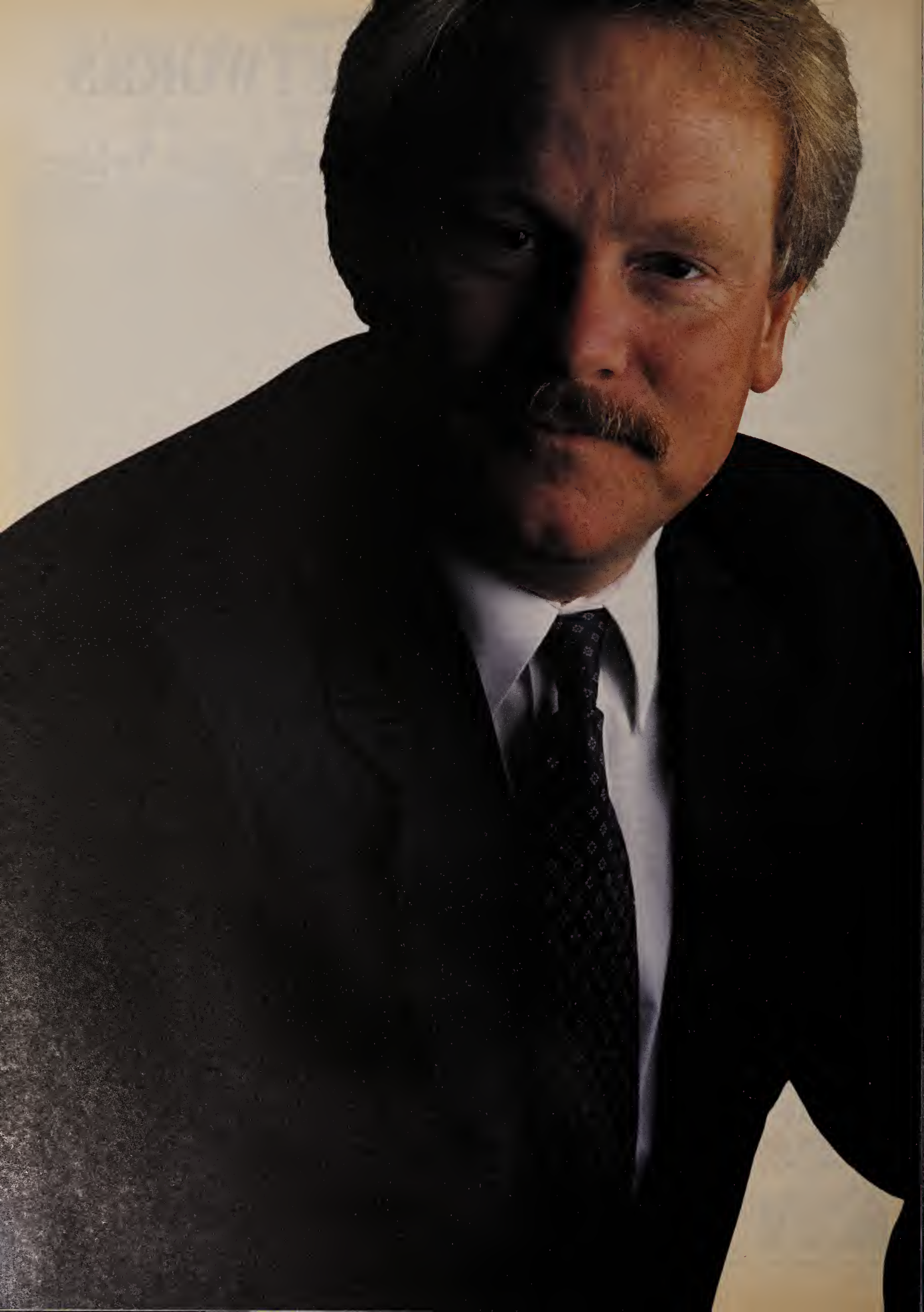
By housing your equipment on our premises and under our care, you get 24-hour maintenance and security, which can reduce your staffing requirements and

free up expensive floor space for other uses. You also gain access to our expertise in foreign regulations, equipment standards, and even local customs and culture which can have an impact on telecommunications.

For more information about our European and U.S.-based facilities management centers, contact us at 800-733-3755, FAX: 212-607-2274

WorldCom

THE INTERNATIONAL TELECOMMUNICATIONS SPECIALISTS • A TELE COLUMBUS COMPANY



“We’ve got a complete SAA system up and running, and it’s hard to say who’s happiest: our programmers, our users, our customers, or me.”

Keith Sievers, VP/Information Systems and Treasurer,
Federal Kemper Insurance Company

Federal Kemper Insurance Company is a home and auto insurer who’s found some insurance for themselves, against system obsolescence.

It’s a policy called SAA,[™] or IBM Systems Application Architecture.[™]

Their SAA system is a client-server approach that ties IBM PS/2[®]s running OS/2[®] (in remote locations and the home office) with an ES/3090[™] host. They chose SAA for both short- and long-term advantage.

“In our business,” says Keith Sievers, “there’s a tremendous need to cut costs, to make everybody as useful as possible. SAA is helping us do that. We also need a platform that’s consistent, easy to manage, and built for growth. For us, going with SAA was just the obvious thing to do.”

For programmers.

The first people to notice an improvement were FKI’s programmers.

“We did everything in COBOL, but in the Presentation Manager[™] environment,” says Keith. “All of a sudden, people who’d been here for years were driving to work a little faster. They were doing better work, they were making a difference, and they saw results quickly, even without CASE tools.”

FKI now has applications for data, image and customer service that are easy to use and easily portable. And they’re delivering more function to users at less cost, thanks to SAA’s cooperative processing.

Says Keith, “Under SAA, we’re moving a lot of our processing from the mainframe to PCs, which offer flexibility and portability. And we see real benefits from a disaster recovery standpoint.”

For users.

And do users like it?

“They ought to,” says Mr. Sievers, “they helped us design it. SAA screens are sort of a personal thing, so it only made sense to include the people who’d be using them every day. Our old screens had acronyms tucked into every available space. The new ones are a lot easier to look at and understand, and everybody loves the mouse. It’s less like work and more like fun.”

And while multitasking doesn’t mean much to the public, it’s going to be a real plus for FKI’s customers.

For customers.

“When policyholders call with questions, they want answers fast. And when our SAA system is fully implemented, they’ll get them. Our representatives will be able to solve problems on the spot just by popping a new window onto the screen. Instead of ‘I’ll get back to you later,’ they’ll say ‘Here’s the answer right now.’”

Keith Sievers has other reasons for liking SAA, especially since MIS isn’t his only job. He’s also the company treasurer.

“We wanted a leading-edge system that would still be leading-edge five years from now, a base we could build on, something we could enhance with AI, voice or image technology, but without having to toss out what we already owned. People ask questions about SAA, but of all the options we explored it was easily the *least* questionable.

“We’re very competitive, and the truth is, only two things separate insurance companies—cost and service. SAA gives us an edge both ways.”



Issues to sidetrack int'l net projects

continued from page 27

30-day commitments for domestic lines. One European PTT also wanted to take ownership of the equipment at our site, lease it back to us and have us pay them to maintain it.

Not only was their request more costly than what we proposed, but the PTT could not offer the skill level needed to operate the equipment as effectively as the project team could.

Regulations

Determining what hardware and software is available and approved by the host countries is not a trivial process. Doing so

would most likely require many calls to vendors, their foreign representatives and several PTTs before obtaining a definitive answer. The answers also have a tendency to change weekly, depending on whom you talk to at the PTT.

On one project, we determined that we were using an authorized T-1 bandwidth manager, but our contact failed to mention that a special card in the equipment was not approved.

In another case, the multiplexing equipment that was approved for our European sites was not the same version as the equipment we used in the U.S.

The good news is that the European Community has agreed in principle to enable vendors to obtain approval from a single testing facility that will be valid

throughout the European Community. However, this agreement is not yet binding, and how quickly member countries can or will comply has not been determined.

Maintainability

Once users obtain the equipment, they may have difficulty finding a vendor that can adequately support it in a foreign country. When we requested a service agreement for our European locations, one vendor offered us six agreements, one for each country. Not only would this have multiplied our negotiation costs, it failed to provide us with a central point of contact.

Also, service agreements can vary. While AT&T begins to provide credits after

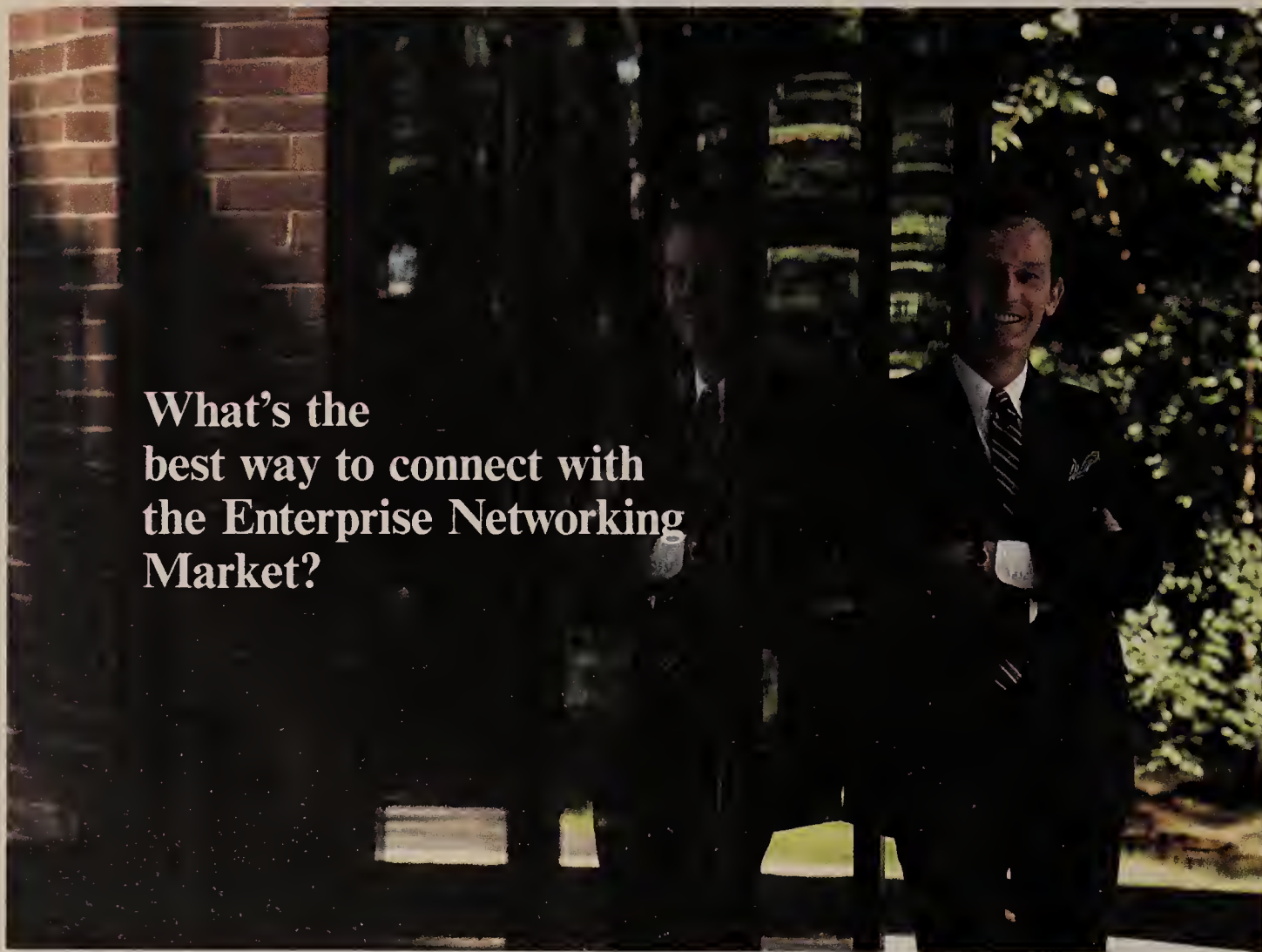
four hours of service outage, some PTTs only begin to consider them after 24 hours and others only after outages of more than three days.

Although efforts toward standardization based on the Open Systems Interconnection model are getting significant attention, many of the implementations of these so-called standards differ among countries.

Perhaps as deregulation progresses and standards improve, building an international network will be no more difficult than building a domestic net.

However, if users embark on a project thinking that building a network is going to be easy, they're in for a rude awakening, not to mention some excessive lead times and higher-than-expected expenses. ■

Gary Beach, Publisher, *Network World*



What's the
best way to connect with
the Enterprise Networking
Market?

Get Gary Beach on the phone.

Network World
is part of
IDG's
worldwide
family of
publication,
exposition and
research companies
providing the best
in information
on the
information technology
industry.

Gary publishes *Network World*, IDG's newsweekly for users of enterprise-wide local and wide area networks. Rated the best in its field by a comprehensive Wall Street Journal Study, *Network World* is the "most important/useful" publication reaching the fastest growing segment of the computer/communications technology industry.

Network World's readers are leading and shaping the enterprise networking revolution. And they've come to depend on *Network World* for the hard news they need to keep up with this rapidly changing field. Quality editorial and quality readers are two reasons why our ad pages continue to grow.

Network with Gary Beach at 1-508-820-2543. He'll show you why the time to position your products and services to the enterprise networking market is now and the publication is *Network World*.

International Data Group
5 Speen Street
Framingham, MA 01701-9171
(508) 875-5000

IDG
Answers for the Information Age.

Radio giant 'bridges' int'l network centers

continued from page 27

cut transmission costs in half while at the same time increasing bandwidth," said Robert Short, director of information systems for RFE/RL. By compressing data at a 2-to-1 ratio, the company can use fewer lines to send traffic to the data centers in Munich and Washington, he added. Eventually, RFE/RL plans to upgrade the MLBs to support 4-to-1 compression.

RFE/RL also plans to add one MLB supporting satellite links for redundancy purposes at each of the three data centers.

In addition, some news bureau sites that previously used several circuits to support voice and data can now use a single line to support compressed data and still have enough bandwidth to carry voice traffic.

"These lines are digital lines; they can carry anything," Short said. "You give me a 64K bit/sec line, and I'll give you voice, data, fax and broadcast on the same line."

The network has allowed RFE/RL to dramatically reduce its reliance on international lines, De Toro said. The company previously spent \$700,000 annually for the point-to-point lines but said that cost will now decrease to about \$350,000 per year for the higher speed lines.

Another benefit of the new network is that it permits a "lights-out operation" at remote bureaus — meaning network personnel are not needed — due to greater centralized control at the Washington and Munich headquarters. This is important, De Toro said, because of insufficient in-house expertise at the remote sites.

Because most of the applications that run over the network are mission-critical — for instance, providing on-line support for input from 30 news agencies and being updated continuously — De Toro is adding redundancy to the net by installing MLBs to carry satellite traffic in the event the fiber lines fail.

When RFE/RL designed its master network plan in 1987, net managers estimated the project would cost \$13 million over five years. De Toro said the project was completed two years early at a total cost of \$8.5 million. He added that the reduction in line costs and greater bandwidth will allow the network to pay for itself after one year.

"This type of setup gives us much more flexibility in the long run," De Toro said. "But the biggest benefit is that it gives us the peace of mind that if a primary link fails, there's a backup network in place to make sure our operations remain unaffected." ■

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

ACC to add SMDS interface to bridge/routers

Advanced Computer Communications (ACC) last week announced it will add an interface for the Switched Multimegabit Data Service (SMDS) to its line of remote bridge/routers.

The interface will be an optional software module for ACC's Series 4000 multiprotocol bridge/routers, which will enable the devices to utilize future SMDS services.

ACC said the **Series 4000 SMDS interface** will be available to carriers by year-end 1991 and will likely be offered to users in early 1992. The firm has not set pricing.

Advanced Computer Communications, 720 Santa Barbara St., Santa Barbara, Calif. 93101; (805) 963-9431.

Firm unveils Ethernet cards for Macs

Compatible Systems Corp. last week introduced two Ethernet adapters for Apple Computer, Inc. Macintosh IIsi and SE/30 microcomputers, as well as a gateway/router that links Apple LocalTalk networks to Ethernets.

The **Ether/DS adapter**, scheduled to ship in February at a cost of \$395, features 16K bytes of memory and a 16-bit direct slot interface. It is designed as a low-cost card for linking Macintoshes into Ethernet local-area networks.

The **Ether/VHP** adapter, is optimized for server applications. It offers 32K bytes of memory and a 32-bit direct slot interface. It is also scheduled to ship in February at a price of \$595. Both will be available in coaxial and 10-BaseT twisted-pair versions.

The **Ether*Route/TCP** is a LocalTalk-to-Ethernet gateway/router with Transmission Control Protocol/Internet Protocol support. The product supports both thick- and thin-wire Ethernet, as well as 10BaseT networks. It offers two independent LocalTalk ports and one Ethernet port.

Priced at \$1,895, the Ether*Route/TCP is expected to ship this month.

Compatible Systems Corp., P.O. Drawer 17220, Boulder, Colo. 80308; (800) 356-0283. ☐

Zenith links E-net nodes to broadband

GLENVIEW, Ill. — Zenith Communication Products recently announced a bandwidth-efficient device that customers can use to link Ethernet devices to broadband coaxial cable networks.

The ChannelMizer, available in two versions, enables users to establish a single 6-MHz channel on a broadband cable network for use by Ethernet devices without disturbing other services supported by the nets. Zenith claims that products providing similar functions require as many as three 6-MHz channels.

The ChannelMizer is available for single- or dual-cable broadband networks. The single-cable version is equipped with two standard attachment unit interfaces (AUI) for connection to Ethernet nodes and one radio frequency (RF) connector for linking with the broadband cable.

The dual-cable version comes with two AUI connectors and two RF connectors. Both devices are equipped with a frequency-agile RF modem that can be tuned to one of five 6-MHz channels.

ChannelMizer comes with five LEDs for diagnostics. An optional network management system enables the device to be monitored and controlled remotely. Net management functions include changing channel frequencies and transmission levels.

Protocol transparency

Because the device is essentially a media attachment unit, it provides for protocol-transparent operation and can be used with any network operating system or net protocol.

The ChannelMizer is reportedly compatible with Zenith's line of network products and standard Ethernet equipment from other vendors. Both versions of the product cost \$1,995 and are available within 60 days of order.

Zenith Communication Products, a division of Zenith Electronics Corp., can be reached by writing to 1000 Milwaukee Ave., Glenview, Ill. 60025, or by calling (708) 391-8181. ☐

Xyplex LAN wares include 10BaseT card, E-net bridge

By Tom Smith
Senior Writer

BOXBOROUGH, Mass. — Xyplex last week announced an array of local-area networking products, including a 10BaseT card for its communications servers and a local Ethernet bridge.

The Maxserver 3610 is a 10-BaseT repeater card that enables users to connect as many as 12 10BaseT Ethernet nodes to the MAXserver 4000 or 5000, which are five- and 16-slot wiring chassis, respectively. Those units previously supported thick and thin Ethernet connections, terminal server cards, gateways and a remote Ethernet bridge.

The Maxserver 3610 is available with a Simple Network Management Protocol (SNMP) software agent that allows the product to be managed by any SNMP-compliant net management station. It costs \$2,295 without the SNMP agent software and \$2,695 with the SNMP agent.

In addition, the firm announced the 3101 Media Access Unit, a transceiver that lets thick-wire Ethernet nodes connect into a 10BaseT hub such as the Maxserver 3610. It costs \$199.

Last week's announcement also included the Maxserver 3510 Local Bridge for the Maxserver chassis. The 3510 is a single-port,

media access control-layer Ethernet bridge designed to enhance net performance by segmenting traffic-intensive nodes on the LAN. It supports the Spanning Tree Protocol and comes with an SNMP agent.

The 3510 costs \$2,995.

In addition to the hardware announcements, Xyplex released Version 3.1 of the Xyplex Multi-Protocol Terminal Server Software for its Maxserver terminal servers.

The new software enables asynchronous terminal users to support two sessions simultaneously on a single screen. Under the new Multi-Sessions capability, users can establish Digital Equipment Corp. Local Area Transport, Transmission Control Protocol/Internet Protocol, TN3270 or a combination of those sessions. TN3270 allows users to establish an IBM 3270 terminal-emulation session over a Telnet connection.

Current Xyplex terminal server users can receive the new software free of charge; it will cost \$200 for new users. All of the products are expected to be available in the first quarter of 1991.

For more information, contact Xyplex at 330 Codman Hill Road, Boxborough, Mass. 01719, or call (508) 264-9900. ☐

Firm unveils option to LAN superservers

Intelligent controller on The Network Connection's 80486 Triumph eases disk I/O demands on server.

ALPHARETTA, Ga. — The Network Connection last week announced an Intel Corp. 80486-based file server that it claims will outperform superservers in certain local-area network environments.

The company's 33-MHz, 80486-based Triumph server is a single-processor model that supports the Extended Industry Standard Architecture and features an intelligent peripheral controller architecture.

The Triumph server comes with an intelligent cache controller board that significantly reduces disk access by storing frequently used files in a large cache memory, according to Will Riner, chief executive officer of the company. This controller board — which includes a Motorola, Inc. 68020 and 16.5M bytes of memory — enables data requests to be handled in 0.2 msec and supports data transfer rates of 33M byte/sec, he said.

Riner said this capability will enable the Triumph server to compete effectively against superservers from Compaq Computer Corp., NetFRAME Systems, Inc. and others that support standard network operating systems.

"Those machines are nice if you have the multiprocessor operating system to run on it,"

The controller board enables data requests to be handled in 0.2 msec, Riner said.

▲▲▲

Riner said. "But 90% of the market today is [Novell, Inc.] NetWare, and Novell currently has no plans for a superserver version of its software. So a device like that is practically useless to most people."

Riner claimed that the Triumph has already outperformed Compaq's SystemPro, as well as superservers from NetFRAME and Tricord Systems, Inc. in tests running NetWare.

The Triumph server comes standard with 16M bytes of memory (expandable to up to 64M bytes) and can accommodate four 1.3G-byte disk drives. Per-

sonal computer workstations outfitted as a server support only 2G bytes of disk storage, Riner said.

The server comes with 10 expansion slots, including six reserved for bus master boards. The Triumph server also comes bundled with drivers for NetWare, but Riner said the machine will sup-

"I couldn't touch the price of a Compaq SystemPro. It's overkill for applications today."

▲▲▲

port Banyan Systems, Inc.'s VINES, Microsoft Corp.'s OS/2 LAN Manager and Xenix network operating systems as well.

While the 33-MHz 80486 version of the server comes with a single processor, Riner said The Network Connection plans to ship a multiprocessor version of the server in February.

A typical configuration including 16M bytes of memory, mirrored 1G-byte disk drives, 8.5M bytes of cache memory, monochrome monitor, keyboard and floppy drive costs about \$25,000, Riner said.

Laura Dowling, network manager at Trenam, Simmons, Kemker, Scharf, Barkin, Frye & O'Neill, a Tampa, Fla., law firm, said the 80486 Triumph is cost competitive with superservers.

"I couldn't touch the price of a Compaq SystemPro. It's overkill for current applications today," Dowling said.

Dowling has ordered the new Triumph to support a NetWare 386 network of more than 200 users.

"This machine has the horsepower to move all my users onto a single server and still increase user response times," Dowling said. Currently, the firm's users are spread across three servers.

Dowling said the Triumph's intelligent disk controller will enable the unit to support hundreds of small file-read operations.

For more information, contact The Network Connection, 1324 Union Hill Road, Alpharetta, Ga. 30201, or call (404) 751-0889. ☐

Perhaps its best fea



NEC BusinessMate 386/33E.

Built with 33MHz 386™ microprocessor and EISA

architecture, for high-performance networking and multiuser solutions.

If you see networking and multiuser solutions in your company's future, there's no better investment than the NEC BusinessMate® 386/33E. Because it gives you the performance, capacity and expandability these environments demand.

It comes with 4MB or 8MB of RAM, a 64KB SRAM cache, and room for three full-height and three half-height storage devices. Its 32-bit EISA architecture accepts 8-, 16- and 32-bit cards among eight



Computers and Communications

ture is its future.



expansion slots. And its NEC Host Adaptor supports up to seven SCSI devices, for increased flexibility with no sacrifice in performance.

In short, with support for thousands of applications, you'll have the
Fully compatible with The Santa Cruz Operation® UNIX® and XENIX® UNIX is a registered trademark of AT&T.
power to make your system grow and change as your needs do. Best
XENIX is a registered trademark of Microsoft Corporation
of all, you'll have a system that offers something no one else can offer
Novell certification mark is a registered trademark of Novell, Inc.
at any price: NEC. Which may be the most attractive feature of all.
386 is a trademark of Intel Corporation

For more information, call 1-800-NEC-INFO.

BusinessMate® is a registered trademark of NEC Corporation © 1990 NEC Technologies, Inc.

NEC

OPINIONS

COMMUNICATIONS PROFESSIONALS

BY JACK SOBISH

Long hours, little thanks is just part of the job

I would like to express my dismay about a growing problem I see with the next generation of data communications professionals entering the job market. It appears to me that more young professionals are revolting against having to work off-hours, being on call and wearing pagers, and dealing with end users' attitudes.

While being called in the middle of the night is no picnic, I came up through the ranks with the old school of thinking: Those are the breaks.

Networking professionals provide a service product — communications. Along with the appeal of working on high-technology equipment comes the responsibility of end-user support. Ultimately, supporting devices makes or breaks the data side of telecommunications departments.

Data professionals must contend with end users forced into the computer age.

▲▲▲

Typically, the views and attitudes of voice and data communications departments are diametrically opposed, regardless of whether they are under the same management. While I am not trying to start a war between voice and data professionals, it is true that, in general, end users consider the voice side of the house to be more dependable than the data side. The reason is simple: Everyone has a phone at home and on their desk. To users, basic voice communications is familiar and seems easy to maintain.

Data professionals, however, must contend with end users that, for the most part, have been forced into the computer age. While executive management views voice communications as the lifeblood of a business, they see the data side as a necessary evil. Consequently, data communications professionals are rarely thanked for a job well done. It seems to me that the newer professionals are offended by these user attitudes.

My advice to those who are in this business to get pats on the back is to find another line of work. Face the end users who complain five seconds after a failure but never say thank you when service is restored. Face the fact that you are on call 24 hours a day, seven days a week and that Murphy's Law will always dictate that the worst call will come at the most inconvenient time.

If this does not appeal to you, then don't enter this field. Those of us already working as communications professionals are fighting enough battles without having to deal with this type of attitude within our own ranks.

Can you change the user community's concept of data services? Yes, by killing them with kindness, and by starting surveys and making follow-up calls to get their input on the quality of service rendered. Many end users are intimidated by computer and communications technology and, consequently, by the people supporting it.

The key to winning kudos from the user community is to be visible when the network is running fine. When users feel comfortable with you, you may even see a few commendations put in your personnel file.

Being on call may ruin a good night's sleep. Coming in repeatedly at 4 a.m. to perform a sysgen on a new file server or reconfigure the network may not be glamorous, but those are the responsibilities of the job. Newcomers to the data communications field should learn to live with them or consider a career change. ■

Sobish is a network analyst for Dow Corning Corp. in Midland, Mich.

NETWORK WORLD

Editor
John Gallant

Executive Editor
John Dix

Assistant Managing Editor — News
Charles Bruno

Senior Editors
Bob Brown — Industry Update
Jim Brown — Data Communications
Barton Crockett — International Networking
Paul Desmond — Data Communications
Wayne Eckerson — Management Strategies
Bob Wallace — Telecommunications

Senior Writer
Tom Smith — Local Networking

Staff Writer
Maureen Molloy

West Coast Bureau
2088 Union Street, Suite 2
San Francisco, Calif. 94123

Washington D.C. Bureau
Anita Taff — Bureau Chief
(202) 347-6184

Ellen Messmer — Correspondent
National Place
1331 Pennsylvania Ave. NW, Suite 505
Washington, D.C. 20004
(202) 347-4180

President/Publisher
Gary J. Beach

Director of Financial Operations
Mary Fanning

Features Editor
Paul Strauss

Managing Editor — Features
Bruce Guptill

Features Writer
Salvatore Salamone

Assistant Features Editors
Alison Conliffe
Susan Collins

Art Director
Dianne Barrett

Informational Graphics Designer
Susan Champeny

Junior Graphic Designer
Susan Slater

Assistant Managing Editor — Production
Beth Khoury

Associate Editor
Joanne Cummings

Copy Editors
Michelle Beaulieu
Karen Moltenbrey

Assistant to the Editor
Cheryl Tynan

Editorial Assistant
Tracie Seder

Contributing Editors
Daniel Briere
James Kobieltus
Edwin Mier
Alan Pearce

Network World
161 Worcester Road
Framingham, Mass. 01701
(508) 875-6400
MCI Mail — 390-4868
FAX: 508-820-3467

An IDG Communications Publication

USER ADVISORY PANEL

Laurie Bride
Manager, Network Architecture
Boeing Computer Services

Roy Bruce
President
International Communications Association

Al Crawford
Senior Vice-President
American Express TRS Technologies, Int'l

Phillip Evans
Director, Telecommunications
FMC Corp.
Senior Vice-President
International Communications Association

Len Evenchik
Director of Communications
The Commonwealth of Massachusetts

Thomas Festa
President
Wall Street Telecommunications Association

Lionel Gillerman
Telecommunications Services
McDonnell Douglas Aerospace
Information Services Co.
Vice-President for Regulatory Affairs
Telecommunications Association, Inc.

Jan Hackmann
Director of Telecommunications
Multicare Medical Center
President, Telecommunications Association, Inc.

Michael Kaminski
Manager, CIM/Networking Technologies
General Motors Corp.

Ron Kopitowsky
Telecommunications Director
Metropolitan Transportation Authority, New York State
President, Communications Managers Association

Chuck Papageorgiou
Network Administrator
United Parcel Service

Henry Pfendt
Director, Information Technology Services
Eastman Kodak Co.

Kenneth Phillips
Vice-President, Office of Telecommunications Policy
Citicorp
Chairman, Committee of Corporate
Telecommunications Users

William Pomeroy
Director of Telecommunications Public Policy
International Communications Association

Michael Toto
Vice-President, Corporate Telecommunications
Johnson & Higgins
President
Association of Data Communications Users

Stanley Welland
Manager, Corporate Telecommunications
General Electric Co.

EDITORIAL

What AT&T's computer bid means to users

If the AT&T offer for computer maker NCR Corp. comes to fruition, it could result in good news for the networking world — despite the horrible lack of success of computer company mergers.

AT&T has had computers on its corporate mind for years; it has always believed that big digital telephone switches are essentially computers. AT&T submitted to the divestiture of its local operating companies rather than lose AT&T Bell Laboratories and its high-technology equipment makers.

Why? Because it envisioned becoming a computer giant in a world of linked computers. AT&T first attempted to gain market share with its 3B line of minicomputers. It then formed an alliance with Italy's Ing. C. Olivetti & Company, S.p.A. to sell personal computer clones. Neither effort was successful.

NCR — formed in the late 1800s as National Cash Register

Co. and noted in networking today for NCR Comten, a maker of front-end processors — is one of the last two unmerged members of seven giant mainframe makers that once competed closely with IBM.

These were known as the BUNCH: Burroughs Corp. and Univac (which later merged into Unisys Corp.), NCR, Control Data Corp. and Honeywell, Inc. (which has now been acquired by the French computer maker Group Bull SA).

It's too early to say whether AT&T will be successful in its bid. It undoubtedly could win a tender, but a forced marriage would not be as valuable to AT&T as a cooperative merger.

If the NCR deal falls through, AT&T's interest in a major computer maker is unlikely to fade. If AT&T acquires NCR, it will probably have to divest its 18% stake in Sun Microsystems, Inc. If it doesn't obtain NCR, AT&T might bid for the rest of Sun, or

for Data General Corp. or Tandem Computers, Inc. Several years ago, there were rumors that AT&T was interested in acquiring Digital Equipment Corp.

When firms merge, competition generally diminishes. In the case of AT&T and NCR, however, a merger might very well result in a strengthened competitor to IBM. Although NCR shows signs of recovering from a long period of stagnating market share, it does not have the deep capital resources of AT&T.

There is some synergy between the two companies: Both stress the importance of standards in networking, both focus on Unix, and both see strength in products compatible with Open Systems Interconnection as their long-term strategy to compete with IBM.

If AT&T wins NCR, the combination could encourage standard networks. And if a stronger computer company results, that would be good for users too. ■

OPINIONS

CLIENT/SERVER COMPUTING

BY JAMES KOBIELUS

How to remake networks in the user's image

Client and server are the yin and yang of network computing. Servers, which receive wide user recognition and are blessed with a fast growing market for server hardware and software, are by far the more prominent side of the equation.

Clients are, by contrast, relatively unsung and overlooked. This disparity may be due to the fact that the client is more of an architectural concept than an identifiable piece of hardware or software. Client functionality is usually embedded within workstation shell programs or environments that provide user-friendly hooks into file, data base or communications management server programs.

There is no reason why client functions should reside only on the user's workstation. As applications and data are dispersed throughout the local- and wide-area network, the client should follow in hot pursuit, spinning off pieces of itself to reside on various servers and other computers. From these net outposts, client offshoots can monitor events, run chores and fetch data. This capability — which may be called the distributed client — is falling within reach of users, thanks to advances in the following technologies:

■ **User interface environments.** A powerful user interface specification, such as the Massachusetts Institute of Technology's X Window System or IBM/Microsoft Corp.'s Presentation Manager, provides a means for integrating otherwise separate client application front ends under a single graphical command-and-display environment.

■ **Global naming.** Global naming enables distributed client components to track one another's locations — and those of servers — without the burden of maintaining collocated directory tables. Naming services are available in LAN environments such as Banyan Systems, Inc.'s VINES and Novell, Inc.'s NetWare.

At the workstation front end, global naming frees the user from having to specify precise network path names when accessing remote applications and files. Instead, users simply invoke LAN/WAN applications using names that are logical to them. The client relies on a shared directory to perform address translations and to navigate the network.

■ **Object management.** As supported in Hewlett-Packard Co.'s New Wave Computing Architecture and similar environments, object management enables distributed client components to function as one logical entity on the network. Client processes inherit all privileges and restrictions associated with their respective users and user groups. Those parties are registered as objects on the LAN or WAN.

In addition, distributed client processes can identify one another as affiliated or nonaffiliated, which helps them determine whether to back off or negotiate when contending for limited resources, such as files and printers. The LAN/WAN is thereby presented with a single, consistent user image, regardless of how many affiliated client offshoot processes populate the on-line world.

■ **Multicasting.** Multicasting enables the distributed client to spin off and control multiple subsidiary processes concurrently. This capability — supported by the asynchronous remote procedure call capability in BBN Systems and Technologies Corp.'s Cronus as well as in similar environments — enables the distributed client to fan out quickly and tap into the aggregate LAN/WAN processing capacity.

Consequently, the distributed client can run applications as large and complex as can be handled by the amount of network-accessible CPU and memory the client can accumulate in any block of time.

■ **Automated agents.** A feature of HP's New Wave, automated agents are distributed client processes that have taken up virtually permanent residence on LAN and WAN servers and other computers. They operate in background mode in accordance with user instructions and subject to restrictions imposed by host computer and LAN administrators.

Automated agents can perform repetitive and time-consuming tasks that users might otherwise have to perform themselves.

■ **Resource bidding and brokering.** Distributed client processes often have to contend for computer resources against other users and, now and then, among themselves.

A bidding and brokering scheme — such as the one in Xerox Corp.'s Spawn architecture — creates an orderly on-line "market" for distributed computing resources. Client offshoots bid on access to remote computing power, program logic and data. Servers evaluate bids and award access based on some notion of profit maximization, efficiency or equity.

■ **Security.** The distributed client contains user-sensitive information such as passwords, personnel records and financial data. Corporations would be loath to implement distributed clients without strong, network-wide authentication and confidentiality capabilities.

The days of server-centered network computing are numbered. The dominant LAN/WAN application architecture of the future will be client-centered and personalized, based on a synthesis of the technologies discussed above. The ultimate realization of this vision — the distributed client — will remake networks in the image of their users. □

Kobielus, a contributing editor to Network World, is a telecommunications analyst with Fairfax, Va.-based Network Management, Inc., one of the largest local-area and wide-area network systems integrators in the U.S.

DIVERSITY OF OPINION is basic to our nation, according to James Bryant Conant. Well, it's basic to *Network World*, too. Express your opinion by writing a column for us.

Columns should be 600 words in length and submitted on disk, via modem or through MCI Mail at 390-4868.

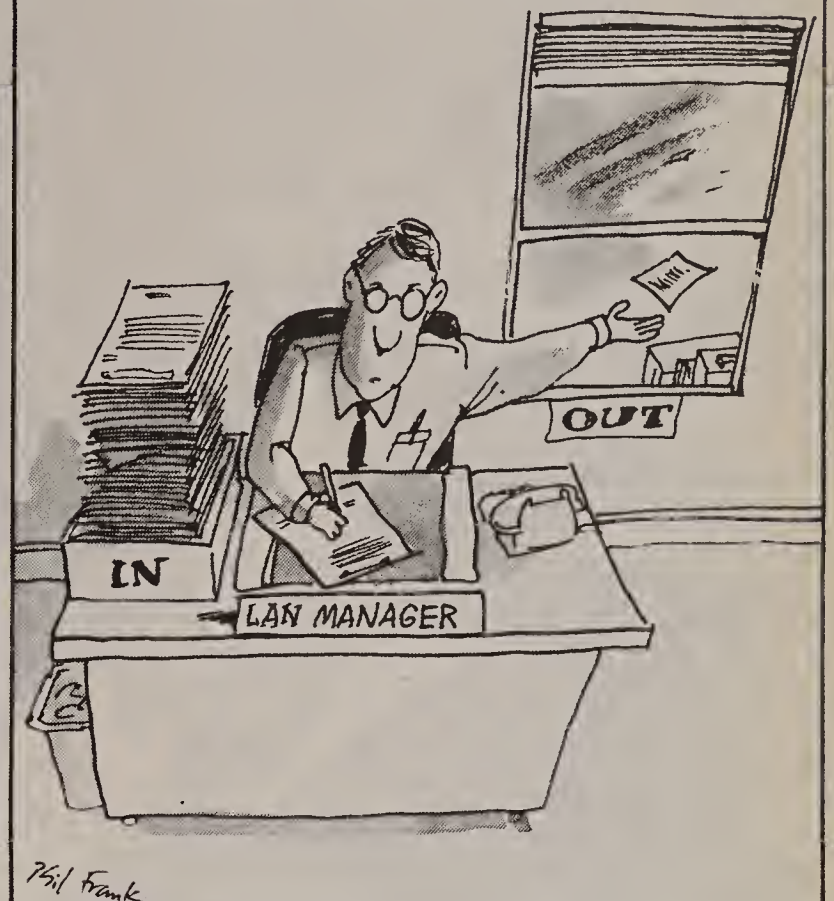
If you'd like to write a column, call Alison Conliffe, assistant features editor, at (508) 820-7416 or fax your idea to us at (508) 820-3467.

TELETOONS

BY FRANK AND TROISE

The Network Manager's Handbook Visual aid #22

Candid photo of network staff member misunderstanding the concept of OUTSOURCING:



and another thing . . .

The cover story in the Dec. 10 issue of *Business Week* — "Farewell, Fast Track" — raises an important issue for network executives as the U.S. heads into a recession.

As businesses pare operations and engage in other cost-cutting maneuvers, salary increases and bonuses will diminish and opportunities for advancement will dwindle.

So how do you keep employees enthusiastic and performing at high levels in this era of belt tightening and fear about the future?

New incentives

Network executives will have to devote more attention to nonfinancial incentives that keep staff members interested, productive and growing.

Many of these methods have been discussed in previous management stories in *Network World*. They include offering employees the chance to pursue new interests and learn other jobs within the department, and giving workers more responsibility and more "ownership" of the operations they oversee.

Managers should also en-

courage employees to receive training and education in other areas, perhaps in specific technical areas that will offer better career opportunities in the future.

None of this is groundbreaking stuff. One of the primary responsibilities of any manager — technology or otherwise — is to maximize the productivity of employees and help them reach their full potential.

But too often, human development falls by the wayside in the crunch to get things done and keep operations running smoothly.

Managers tend to focus on monetary rewards and incentives, rather than carefully assessing the needs of individual workers and helping them achieve personal and career goals.

This occurs particularly when business is booming and opportunities for advancement open up regularly.

But the times are changing, and as the fast track disappears, network executives need to focus more attention on caring for their most important asset — people. □



AT&T introduces a breakthrough

Now that AT&T ACCUNET®
Switched Digital Services has 384 kbps,
you can dial up full-motion video conferences
whenever you want.

Look what just burst onto the switched digital scene: Video conferencing at 384 kbps.

Now that AT&T offers 384 kbps through the public switched network (we're the only ones that do), you can dial up meetings with people outside your private network. And no matter where they are, you'll get such good picture quality, you'll be able to tell

how the people on camera like their coffee.

That's not the end of our good news, either. AT&T's new Switched 384 also gives you the capability to transmit bulk data up to six times faster than our competition. And for image transfer and CAD/CAM, SW384 means rapid response time and crisp, clean images.

Just like our Switched Digital Service at 56 and 64 kbps, SW384 offers you a unique, money-saving advantage; it lets you transmit data as often or as infrequently as you need to, without adding new locations to your private network.

And no matter which speed you choose with SDS, you're

AT&T ACCUNET® Switched 384 Digital Service is the winner of the TeleConX's 1990 "Most Significant Advance in the Field of"



in video conferencing.

transmitting over the only public switched network that's been designed, engineered and maintained exclusively for switched digital data transmissions.

So if your network doesn't always go as far and as fast as you'd like, give us a call. We can help you break into a whole new world of high-speed capabilities.

Innovation. Another AT&T advantage.

For more information on AT&T's ACCUNET Switched 384 Service, call your AT&T Account Executive or 1 800 247-1212, Ext. 108.



AT&T

The right choice.

Teleconferencing Overall" Award.



Making the Centrex choice

By DAVID SABO

When it comes to decision making, examples are often more helpful than general discussions. Take, for instance, the Centrex-vs.-PBX choice. Much has been written about all the factors involved — the various functions, features, benefits and trade-offs.

But each Centrex or private branch exchange choice is different, and each presents unique problems as well as some common ones. What follows is an example of the decision-making process — a step-by-step outline of how one organization, Astro

Office Products, Inc., made its choice.

Astro, a wholly owned subsidiary of Canon USA, Inc., is a dealer in office products. Its main office is located in Gardena, Calif., approximately 10 miles south of Los Angeles. Its five other offices are located in and around Los Angeles.

The bulk of Astro's more than 500 employees work out of the Gardena headquarters, which consists of two buildings — one containing the warehouse and service department, and the other housing the administration and sales force.

Until recently, the company's telephone system consisted of a Mitel, Inc. SX-200 switch, approximately 86 trunks and 200 telephones. In addition, three attendant switchboard consoles resided on the SX-200 — two in the

(continued on page 40)

Sabo is a Group IV marketing specialist in the facsimile division of Astro Office Products, Inc., a Canon USA, Inc. subsidiary located in Gardena, Calif.

Moving to Centrex from a tired, overcrowded PBX gave Astro Office Products room to grow.

ILLUSTRATION ©1990 TOM BARRETT

(continued from page 39)

administration building's receptionist area and one in the service building's lobby.

This telephone system presented Astro with a number of problems. Chief among these were that the Mitel switch simply couldn't handle any more trunks or extensions. Also, the switch's software was in need of an upgrade, which would have cost around \$15,000. It was obviously not worthwhile to pay that much for a switch that could not be expanded.

Astro handles from 1,300 to 1,800 inbound calls daily. At peak times, switch overload frequently caused inbound callers to receive busy signals or a "ring/no answer," meaning the calls sat in a queue for an unacceptably high number of rings.

In addition, Astro's employees were having difficulty gaining access to outbound trunks and were experiencing cross-connection to inbound callers.

Search for a solution

The potential solutions to Astro's switch woes carried big price tags. Price quotes for various PBXs ranged from \$93,000 to \$150,000. Centrex was also considered; however, at monthly tariff rates, the cost of Centrex service was somewhat higher than the cost of a new switch over the switch's assumed three-year life cycle.

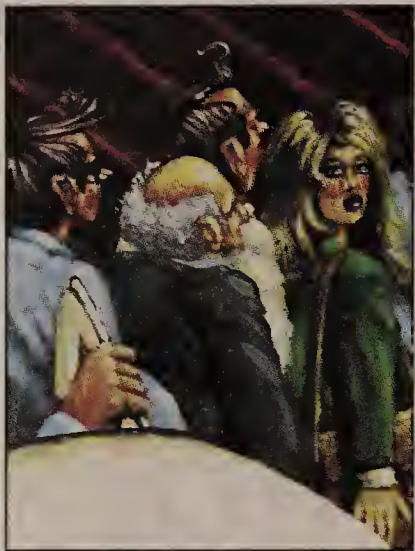
Installing a switch with increased capacity would have solved two problems: the inability to obtain a trunk for outbound calls and the preponderance of busy signals on inbound calls.

However, adding capacity would have compounded the ring/no answer problem. Since Astro's business is sales and service, answering inbound callers with a live human voice is a primary concern, as is routing the call expeditiously.

Increasing capacity without adding personnel would only increase the volume of inbound calls. Adding console operators

For many companies — including Astro — the time and cost of training and keeping competent personnel is often prohibitive. Such firms find Centrex attractive since it frees them from having to commit money and time to learning about telecommunications. In Astro's case, this was a strong motivator for considering the Centrex alternative.

In the spring of 1989, due to continuing problems with the Mitel switch, Astro implemented a small Centrex system of about 12



lines for the telemarketing department. This small-scale implementation, handled by Pacific Bell, was so successful that Astro began to consider Centrex as a corporatewide solution. However, several concerns had to be addressed.

First was whether Pacific Bell had the technical expertise to handle Astro's needs. The company needed to know for certain that Pacific Bell could design a network that was in Astro's operational and financial interest. It also needed to know that the level of service provided would meet Astro's expectations.

A technical representative from Pacific Bell performed a traffic analysis that showed that by implementing Flexible Route Selection — Pacific Bell's trademark for its least cost routing service — Astro could attain a cost savings of about \$70,000 per year.

to be considered. One was Integrated Services Digital Network technology. Astro plans to implement ISDN for specific applications sometime in the future. It, therefore, needed to be certain that a Centrex solution wouldn't preclude future ISDN use.

Pacific Bell assured the company that, although Astro's Centrex service would actually reside on an AT&T 1AESS central office switch, the switch was coresident with a 5ESS at the same central office that could be used for ISDN.

With all concerns satisfactorily addressed by Pacific Bell, Astro voted to go with Centrex.



The final concern was whether implementing Centrex would solve Astro's problems. Company management was particularly concerned with whether the problem of ring/no answer could be resolved without adding another attendant console.

After extensive discussion with Pacific Bell and some careful deliberation, the problem was resolved through a combination of network engineering, a unique attendant console and by changing the way inbound calls flow into the company.

With all concerns satisfactorily addressed by Pacific Bell, Astro management voted to go with Centrex.

The engineered solution

The next step was feature selection. There are two types of features: global and user-specific.

Global features such as call transfer, station-to-station dialing, direct-inward dialing (DID) and conference calling are included in Pacific Bell's basic Centrex package.

Additional global features selected by Astro were call hold, call forward/busy and call forward/don't answer.

The only user-specific feature selected was call pickup, which is implemented on a group basis. For this feature, there is a charge for each group as well as a charge for each line included in the group.

Additionally, management opted to include Pacific Bell's Centrex Management Service in the system.

This option permits the telecommunications manager to perform adds, moves and changes on-line with a personal computer, thus providing Astro users greater flexibility and a greater

degree of control over the system.

Implementing Centrex would immediately eliminate two of Astro's problems.

Because each Centrex extension is a separate line, the problem of outbound callers being unable to obtain a trunk would disappear.

The Centrex DID feature also resolves busy signal problems because it allows inbound callers to directly call the department or individual they are trying to reach instead of first going through the switchboard. More importantly, if a call is transferred from the switchboard to the destination party, the trunk that was being used would be free for the next call.

Management believed that encouraging inbound callers to call DID numbers would also reduce or eliminate the ring/no answer problem. Meanwhile, other methods to both relieve call burden on the console attendants and shorten call processing time were also investigated.

To lighten the operators' call burden, Astro took a two-pronged approach. First, outside sales representatives were instructed to use the DID feature to directly call the secretary responsible for their messages instead of going through the switchboard.

Next, the burden on Astro's overworked 800 number — which was typically experiencing busy signals on 33% of the calls

trex is provided by what Conveyant terms its Local Common Equipment (LCE), a box of proprietary electronics located alongside the in-house cable terminations.

Each LCE can drive four consoles and a total of 16 individual trunks. Each one can also indicate busy status to the consoles for as many as 120 stations.

The Conveyant console uses windowed, personal computer-resident software that allows multiple applications to be displayed on the screen simultaneously. The primary application that runs on the personal computer is a data base of up to 65,500 records, each of which contains five fixed-length fields. The records each contain an employee's name, department and extension number.

In addition to the main data base, a smaller data base is provided that the console attendant can use as a personal directory. Astro is using this smaller data base for most frequently called numbers. The console attendant uses a hot key to toggle between the two data bases.

To search for a field in the data base, at least one leading character is needed. For instance, if a caller asks for Joe Smith, the data base can be searched with an "S," "SM," "SMI" and so on. Once the entry is located, it is highlighted. The operator then hits a key sequence that transfers the call to the intended party. Under the previous system, numbers were

Management opted to include Pacific Bell's Centrex Management Service.



— was relieved by implementing Pacific Bell's Custom 800 service. Custom 800 would allow Astro to route an 800 call to different sales offices based on the caller's geographic location.

Additionally, Custom 800 can be implemented as a virtual number, in which there is no limit to the number of calls that can be active on the number at any point in time.

Many factors such as advertising concentration and time of day affect call load. Having a virtual number in conjunction with Centrex allows for as many simultaneous calls as there are call destinations.

New console technology

A Centrex-based attendant console from Conveyant Technologies, Inc. was selected to speed up call processing. Conveyant's TeleDesk Centrex Attendant Workstation is based on an IBM or compatible personal computer with a custom keyboard.

The actual interface to Cen-

located using a paper directory.

Each console can have individual trunks or trunk groups assigned a priority sequence. When a call is ringing on the console, the attendant hits the NEXT key, which selects the most important call that is ringing. Astro has four trunk groups: 800 numbers, the central number, the service number and re-calls. In addition, there are two lines for the operators: "0" and "#0."

Calls are prioritized based on the sequence assigned to the particular console. For example, calls that come in via the main number receive top priority on one of the administration and sales building's two consoles, while inbound 800 calls take top priority on the other console. Calls that come in via the main service number take top priority on the service and warehouse building's console.

In the previous configuration, not all trunks appeared on all consoles. In the Centrex configuration,

(continued on page 56)

The potential solutions to Astro's switch woes carried big price tags.



was an option, but that involved a cost factor in the form of worker salaries.

Also, it was likely that costly technical talent would be needed to make sure the switch was operating correctly and all available cost savings features from communications carriers were implemented. This became especially apparent when the level of increased trunking required was reviewed; an expansion on the order of 33% was envisioned.

The next concern was whether Centrex itself, beyond the least cost routing feature offered in the package, would be cost-effective for Astro. Pacific Bell proposed a three-year Centrex contract (allowed under a California state tariff) that was substantially lower in price than the monthly tariff. When amortized over the same three-year period, the contract's price met or beat the cost of most switches.

But some technical issues had



D A T A C O M

BUYER'S GUIDE

EDI SERVICES

Doing

CONTINUED FROM PAGE 1
ers and suppliers through electronic funds transfer.

Electronic transmission can shorten the order taking and distribution transaction period, prompting new specialized business applications — such as just-in-time supply for manufacturing or universal product code inventory control.

It also can save companies large amounts of money by re-

Langner is an associate with TeleChoice, Inc., a Montclair, N.J., telecommunications consultancy specializing in long-distance service competitive analysis and network design.

CHART • GUIDE

A Buyer's Guide chart comparing electronic data interchange products and services, including standards, protocols and speeds supported, begins on page 52.

business

ducing document processing costs.

EDI users come in two forms: hub companies and trading partner firms.

Hub companies are large organizations that run many EDI applications in conjunction with a number of other, usually smaller, supplier companies called trading partners. These trading partners concentrate their EDI transactions on the hub company's network, creating a sort of hub-and-spoke type of interaction.

The term "trading partners" can apply to any company with which another firm performs EDI transactions — even other companies that consider themselves hubs for their set of trading partners.

In many cases, hub companies reap the largest benefits from EDI. For this reason, hub firms often will provide financial and

electronically

technical assistance to help trading partners adopt EDI.

Currently, the grocery, chemical, automotive, transportation and retail/warehouse industries are well established in EDI. They have established standards for their industry-specific documents and are actively using EDI.

Others, such as the health care, insurance and telecommunications industries, are just starting to get involved in standards-based EDI.

Despite these pioneering efforts, EDI is still not used on a widespread basis. About 12,000 businesses currently use EDI, and that number is expected to grow

to 17,000 by year-end 1991. These numbers represent steady growth for the EDI industry.

However, considering that there are more than three million businesses in the U.S., the penetration of EDI into the business world has not lived up to the lofty expectations of early EDI pioneers.

There are several reasons for EDI's slow penetration into the business marketplace.

■ **Lack of companies with which to communicate via EDI.** This is the most important reason that EDI has been slow to infiltrate U.S. businesses. Unless
(continued on page 53)

EDI services, off
to a slow start,
need standards push
to gain momentum.

NETWORK WORLD

The Newsweekly of User Networking Strategies

Volume 7, Number 9

An IDG Communications Publication

February 26, 1990

Novell bows to users on Named Pipes

By Laura DiDio
Senior Editor

Facing pressure from users, Novell, Inc. did an about-face last week and promised to deliver Named Pipes for DOS software before year end.

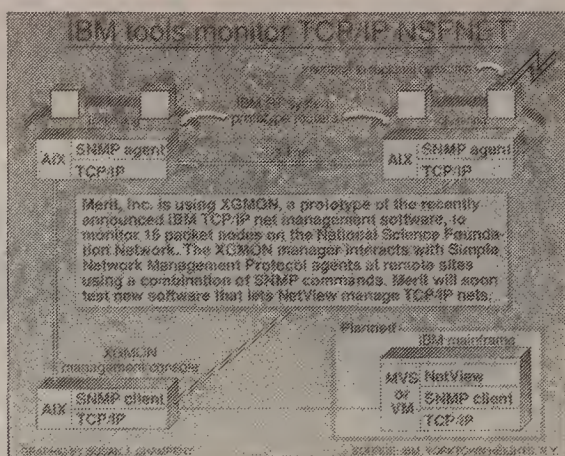
In an interview last month, Darrell Miller, executive vice-president of Novell's software group, said Named Pipes for DOS was "on the back burner due to lack of user demand" ("Top Novell execs discuss strategy," *NW*, Jan. 22). He said only two major users had requested the product, adding, "We won't do it unless we see significant user demand."

But users were quick to react, calling Novell and *Network World* to express their need for Named Pipes for DOS. That user demand was also very much in evidence at the Network '90 trade show in Boston earlier this month, Miller admitted.

"Based on recent end-user feedback, we've put Named Pipes for DOS back on the front burner and we'll deliver it as soon as possible," Miller said.

Among other functions, the product would enable DOS workstations on a NetWare local-area network to communicate with Microsoft Corp.'s SQL Server, running on a dedicated OS/2 workstation, using the Named Pipes

(continued on page 56)



Prototype of IBM TCP/IP mgmt. tool trialed at Merit

XGMON system enables consortium to manage 16-node T-1 network of IBM switches, routers.

By Paul Desmond
Senior Writer

ANN ARBOR, Mich. — Merit, Inc. is using a prototype version of a recently announced IBM TCP/IP net management product to manage the National Science Foundation Network (NSFNET).

The system, dubbed XGMON, uses the Simple Network Management Protocol (SNMP) to manage a collection of prototype IBM routers and packet switches used as backbone nodes in NSFNET. SNMP is the Transmission Control Protocol/Internet Protocol network management standard.

XGMON is capable of manag-

ing any device that supports SNMP, whether it be on the backbone or a regional network supported by NSFNET. For example, Merit uses XGMON to manage regional network routers from Cisco Systems, Inc. and Proteon, Inc.

Merit is also preparing to test prototype IBM software that will give NetView native support for SNMP. That software will make it possible for NetView to manage Systems Network Architecture nets and devices on TCP/IP networks that support SNMP.

IBM announced that capability (continued on page 59)

FCC weighs plan to ease rules on AT&T

AT&T-sponsored proposal would free carrier from filing tariffs for custom net arrangements.

By Anita Taft
Washington Bureau Chief

WASHINGTON, D.C. — The FCC is considering a plan to end regulatory oversight of AT&T's custom network arrangements, freeing the carrier to offer such deals through private contracts rather than public tariffs, *Network World* has learned.

The plan, which would cover services currently offered under Tariffs 12, 15 and 16, was formulated by AT&T and may be included in a proposed Federal Communications Commission rule making to be discussed at a scheduled March 8 public hearing.

The rule making is expected to outline changes being considered by the FCC for regulating AT&T in light of growing competition in the interexchange market.

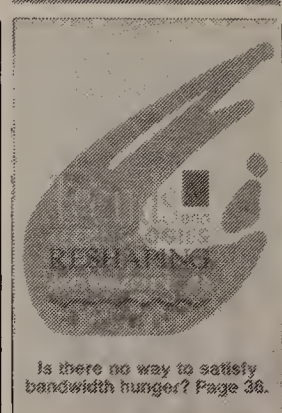
William Catucci, corporate vice-president of federal regulatory affairs at AT&T, said the carrier has discussed a plan with FCC officials that would reclassify offerings targeted to large users as non-common carrier services. Currently, all AT&T services are classified as common carrier services, meaning they must be available to all customers under uniform terms and conditions.

Categorizing custom network arrangements as non-common

carrier services would enable AT&T to offer them without filing for FCC approval.

"We're hoping that the commission will put this [idea] in their proposed rule making as a possible way of treating competi-

(continued on page 58)



User builds LAN-based image tool

By Paul Desmond
Senior Writer

QUINCY, Mass. — A mutual fund service company here has built a LAN-based imaging application, based on a prerelease version of IBM's ImagePlus software, that is expected to support the distribution of some 100,000 documents daily by year end.

Boston Financial Data Services, Inc. (BFDS) is using the IBM Application System/400 version of ImagePlus to support its Automated Work Distributor, a work-flow automation system that is expected to boost employee productivity between 30% and 40%.

BFDS maintains mutual fund shareholder accounts — including handling customer inquiries and generating account statements — for 93 mutual fund management companies.

(continued on page 58)

NETLINE

FBI PROBE OF US SPRINT threatens the implementation of the FTS 2000 network. Page 2.

INNOVATE VS. AUTOMATE, the secret to gaining a competitive advantage. Page 2.

HOSPITALS EXAMINE the merits of HL7 at an annual health care meeting. Page 2.

US SPRINT PROPOSES rate revisions for its Network WATS and Ultra WATS plans. Page 6.

ISDN PROVES ITS WORTH in production use, living up to trial expectations. Page 6.

SUN'S NFS EXHIBITION shows a wide range of industry support for the network protocol. Page 6.

FEATURE

Today's matrix switches blur product boundaries

By David Levin
Special to Network World

Once used primarily in bulk port switching among front-end processors, matrix switches today offer extensive network management, T-1 multiplexing and T-1 cross-connection capabilities. These additional features make the matrix switch worthy of a fresh look by network managers.

As the functionality of matrix switches has grown and changed, so has the market. According to a recently completed

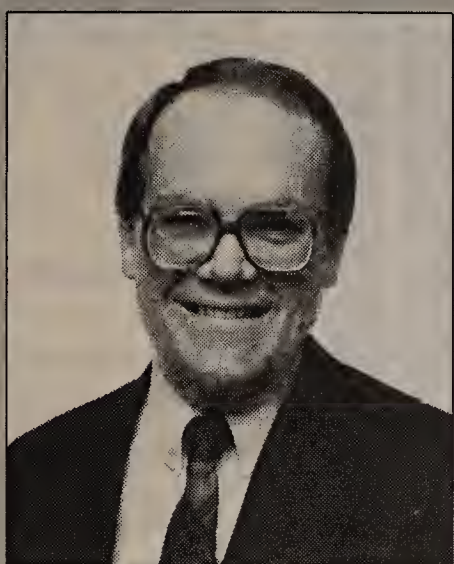
market survey by New York-based consulting and systems integration firm Netcom, Inc., three vendors lead this market: Bytex Corp., Data Switch Corp. and Teleflex Corp. Next come Codex Corp., Datacomm Management Sciences, Inc., Datatran Corp., Dynatech Corp. and Racal Milgo, which resells Teleflex's switch.

Data Switch recently caused a stir within the industry by announcing the Liberator, a fiber satellite unit that con-

(continued on page 43)

NEWSPAPER

“SUPER”



Larry L. Ehlers
Manager of Plant Engineering
Bendix/King, General Aviation
Avionics Division, Allied-Signal, Inc.

"Network World's coverage is the most pertinent to our needs. That's why it's the only weekly I always take the time to read."

Headquartered in Olathe, Kansas, Bendix/King General Aviation Avionics Division, a unit of Allied-Signal, Inc., is a major manufacturer of radios and flight instruments for airline, business, military and owner-flown aircraft. To effectively service over 100 airlines, all aircraft manufacturers, and about 700 dealers worldwide, the company relies heavily on its own telecommunications system. A system that's largely the responsibility of Larry Ehlers, Manager of Plant Engineering.

"In addition to overseeing maintenance and construction, I manage all aspects of networking at our five Kansas facilities, including voice, data and videoconferencing. We utilize a T-1 backbone to connect somewhere between 200 and 300 data users and six videoconferencing rooms, while enabling 3,000 employees to access the network. Our videoconferencing capability alone has given us a competitive edge as it enabled us to speed up product development on a new airline collision-avoidance system and beat our competition to the marketplace.

"We're also one of the first to collocate T-1 multiplexing equipment at a U.S. Sprint point of presence. Our savings here have been substantial. We've drastically reduced T-1 access costs, saved about \$60,000 a year by gaining free access to the Sprint videoconferencing network, and saved

another \$10,000 or so annually on voice and data access lines.

"Bendix/King has long been a pioneer in certain applications of telephony and networking. And *Network World* is one of our most important information sources. As a weekly, it gives us the latest on product availability, networking trends and industry leaders. And it helps us evaluate offerings from carriers and equipment vendors, playing a major role every time we buy. *Network World's* coverage is the most pertinent to our needs. That's why it's the only weekly I always take the time to read.

"Especially useful to us is *Network World's* ability to digest the vast amount of information continually coming out. With only four professionals dedicated to networking, we don't have time to waste. And since we can't be experts in all areas, we rely on *Network World* for expert coverage of the networking issues and applications of greatest interest to us."

Network World. Its exclusive coverage delivers the most focused editorial on enterprise networking every week. Leading users like Larry Ehlers of Bendix/King understand how today's technologies are shaping tomorrow's business successes. That's why, week after week, *Network World* is their most important information source for helping ensure a competitive edge.

NETT"

ACCESS SERVER

Freedom of Choice...

A New Family of Terminal Servers from Gandalf!!

Gandalf's new Access Server family of terminal servers offers unparalleled flexibility by providing connectivity in multi-protocol environments.



LAT™ Terminal Server

- Local and remote terminal access to DEC Ethernet-based resources; LAT licensed software
- Simultaneous TCP/IP, X.25 or non-Ethernet host access available



TCP/IP Terminal Server

- Access TCP/IP hosts over an Ethernet network
- Utilize as an X.25/TCP/IP gateway



Wide Area Terminal Server

- Functions as a large statistical switching multiplexer or X.25 PAD
- Connects remote users via statistical multiplexing or X.25 to TCP/IP or LAT

For more information, call 1-800-GANDALF ext. 200

Circle Reader Service No. 1

gandalf

CABINETS



CABINETS

Price starts from \$695.00.

Immediate delivery!
All sizes and colors!

New LAN Server Cabinet Available.



AT&T Paradyne
Authorized Distributor

4040 Nine/McFarland Road, Suite 800 • Alpharetta, Georgia 30201
(404) 664-3510 • (404) 664-3610 (FAX) • (800) 726-0278

Circle Reader Service No. 3

CSU

Upgrading to ESF on your T-1 circuits?



We'll give you \$500 for your old CSUs

If you upgrade your existing CSUs to Verilink Intelligent ESF CSUs by December 31, 1990, your existing CSUs, regardless of manufacturer, are worth up to \$500 credit against your purchase. Call now for more information and take advantage of the network management benefits of ESF today. When you call, we'll send you "The Book on ESF" as a free gift.

1-800-669-4278



VERILINK®

Circle Reader Service No. 4

The Helfrich Company 19782 MacArthur Boulevard Suite 310, Irvine, California 92715

56K BACK-UP

Fully Automatic Back-up for Your Digital Circuits.

Back-up Any Of These:

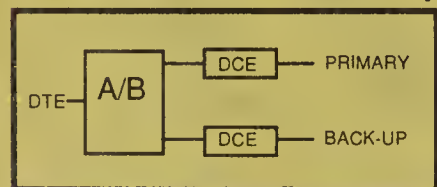
DDS; 2.4K to 56K
T1, Fractional T1
Any/All DS0 Channels

With Any of These:

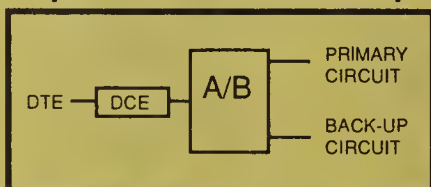
Switched 56
Dial-up Modem (V.32)
Redundant Circuits

Dataprobe offers complete back-up solutions for digital circuits. These Systems feature detection of failed circuit, auto-switching to back-up and restoration to the primary circuit when restored. Two types of back-up are available:

Alternate Route Back-up



Spare Circuit Back-up



Send for detailed catalog and applications bulletins.



170 Coolidge Avenue Englewood, NJ 07631
Phone (201) 569-6464 Fax (201) 894-0939

Circle Reader Service No. 2

DATACOMM MATRIX SWITCH

BLOCKED BY OLDER

MATRIX SWITCH TECHNOLOGY?

Discover the **NEW DIMENSIONS** in Network Management Technology
With the **MTRX** Family of **TANDEM** Electronic Matrix Switches

MTRX-500	512 Ports
MTRX-4000	4096 Ports
MTRX-8000	8192 Ports

BENEFITS

- *Largest Non-Blocked Port Capacity...8192 PORTS
- *Up To 98% Data Cable Reduction DTE to DCE
- *4000 FT DTE TO DCE With Twisted Pair Cable
- *LAN Based PC Control - Ethernet Or Token-Ring
- *Multi-tasking (VM-386) Universal Workstation
- *Integral BERG/BERT and S.A.M. Test Functions
- *Non-Proprietary Database, dBASE III PLUS/IV
- *Supports Data Rates To 2.048MBPS

MTRX

YES
YES
YES
YES
YES
YES
YES
YES

OTHERS

NO
NO
NO
NO
NO
NO
NO
SOME

Over 30,000 Ports Installed At RBOCs and Fortune 1000 Companies



Datacomm
Management
Sciences Inc.

"The Responsive Ones"
Circle Reader Service No. 5

25 Van Zant Street
East Norwalk, CT 06855
TEL: (203) 838-7183

dBASE III PLUS/IV are trademarks of Ashton-Tate Corporation

DIAGNOSTIC TEST EQUIPMENT

Get your hands on the most comprehensive Token Ring cable tester for only \$1495.

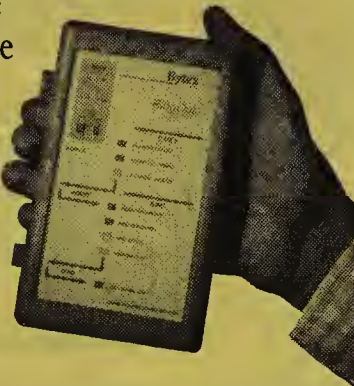
Introducing the Bytex RingOut cable tester—the first designed specifically for Token Ring. And the easiest-to-use. ■ Tests 4 and 16 Mbps STP and UTP LANs. ■ Detects damaged or improperly installed cables or connectors. ■ Confirms correct operation of MSAU. ■ Detects and isolates beaconing nodes. ■ Works on live LANs—no shutdown required. Order by January 1, 1991 for a 30-day money back guarantee.

Call 1-800-23-BYTEX for details now.

Bytex

Bytex is a registered trademark of Bytex Corp.

Circle Reader Service No. 6



FRACTIONAL T1

FRACTIONAL T1 CSU/DSU



- * Compatible with carrier-provided T1 services
- * Inputs in multiples of 56 or 64 Kbps
- * Full management & control capability
- * Two models: Basic and Advanced

RAD

From the growing Rad family.

151 W. Passaic St.
Rochelle Park, N.J. 07662

TEL: (201) 587-8822

FAX: (201) 587-8847

data communications inc.

See Us At Comdex
Sands Expo Center
Booth # N3193

Circle Reader Service No. 8

DIAL-UP MANAGEMENT



Season's Greetings from

Communication Devices, Inc. wishes you all the best in this Holiday Season, and in the new year. We appreciate your support and look forward to serving your dial-up network management needs in the future.

Communication Devices, Inc.

Circle Reader Service No. 16

1 Forstmann Ct. • Clifton, NJ 07011 • 800/359-8561 • Fax 201/772-0747

LAN/FAX GATEWAY SERVER

CAN LAN USERS FAX FROM WORKSTATIONS?

Yes, introducing Imavox's TurboFax-Net, our gateway server! Anyone on the network can send or receive faxes from their workstation. File transfer any text or graphics file at 9600 bps. Use your fax machine as a scanner. Postscript compatible. Supports various printers, scanners and fax machines. Short learning curve means increased productivity. Easy to use and install.

TURBOFAX-NET

LIST PRICE: \$995

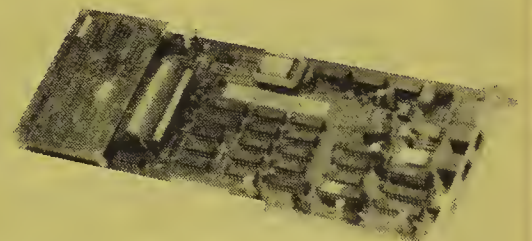
Credit Cards accepted

Also, for stand alone systems

TURBOFAX LIST PRICE: \$395



Imavox



IMAVOX CORPORATION

3350 Scott Blvd., Building 38-02

Santa Clara, CA 95054

800-969-4628; FAX: 408-980-8718

Circle Reader Service No. 9

ETHERNET NETWORK MONITORING SYSTEM



The Network Professor®

- **Multi-Segment** Ethernet/IEEE 802.3 LAN Monitoring System.
- Global Network Monitoring and from **ANY** Location.
- Monitors **ALL** LAN traffic conditions on every segment, for all Stations/Nodes and Protocols, **simultaneously**.
- Alarming for user defined thresholds and detection of error conditions, resulting in **decreased downtime costs**.
- **X-Motif** or **ANSI** user interface provides access to current and historical network statistics via a Relational Database.
- Complies with **ISO Standards** for Enterprise Management.
- Industry proven since 1989. (**CALL NOW** for Fortune 500 references.)

"...only fully functional LAN Monitoring System..."

Bill Hancock

For Literature and your **FREE** Evaluation Package

CALL (213) 379-2505

Look for our **NEW 4 port Local Bridge!**

Circle Reader Service No. 7



Send For Free Info

NW Dec 90

For more information on any of the products and services advertised in *NetworkWorld's ActionCenter*, circle the Reader Service Numbers on this coupon which correspond to the advertisement of interest to you.

Complete the coupon information and mail to:

NetworkWorld

P.O. Box 5090, Pittsfield, MA 01203

Expires 3/31/91

Name _____	1 2 3 4 5 6 7 8 9
Title _____	10 11 12 13 14 15 16 17
Company _____	18 19 20 21 22 23 24 25
Phone () _____	26 27 28 29 30 31 32 33
Street _____	34 35 36 37 38 39 40 41
City _____	42 43 44 45 46 47 48 49
State _____ Zip _____	50 51 52 53 54 55 56 57

NW Dec 90

MEMORY UPGRADE

MEMORY UPGRADES

IBM PS/1 & PS/2 Memory

512Kb, 2Mb Upgrades PS/1's	CALL
2Mb Module Model 80's Model 70-E61;-121	CALL
4Mb Memory Module Model's 55, 65, Adptr Bds	CALL
2, 4Mb Memory Modules Model's 90, 95	CALL
2-16Mb Exp Boards Models 50, 60, 70 & 80	CALL

IBM PS/2 CPU Upgrade

386SX Accelerator Upgrade Model's 50, 50z, 60	CALL
--	------

IBM LaserPrinter Memory

1, 2, 3.5Mb Upgrades IBM LaserPrinter 4019, 4019e	CALL
--	------

IBM RISC 6000 Memory

16, 32Mb Upgrade Kits Series 320, 530, 550	CALL
---	------

COMPAQ Memory

1Mb Add-On Module	\$153
4Mb Add-On Module	\$387

DeskPro 386/20, 25, 20e, 25e	CALL
------------------------------	------

2, 8Mb Add-On Modules	CALL
-----------------------	------

DeskPro 486/25, 386/33, SystemPro	\$9,999
-----------------------------------	---------

32Mb Memory Module	CALL
--------------------	------

DP 486/25, /33, 386/33, SystemPro	CALL
-----------------------------------	------

1, 2, 4Mb Memory Modules	CALL
--------------------------	------

LTE286, 386s/20, SLT286, 386s/20	CALL
----------------------------------	------

Memory Expansion Board	\$136
------------------------	-------

DeskPro 286N, 386N	CALL
--------------------	------

1, 2, 4Mb Memory Modules	CALL
--------------------------	------

DeskPro 286N, 386N	CALL
--------------------	------

AT&T Server Memory

4, 16Mb Upgrades	CALL
------------------	------

Star Server 486/33 E	CALL
----------------------	------

Data General Avilon

4, 8, 16Mb Upgrades	CALL
---------------------	------

Terminals & Servers	CALL
---------------------	------

NEC Memory

1,2Mb Memory Board	CALL
--------------------	------

PowerMate SX Plus	CALL
-------------------	------

2-10Mb Upgrades	CALL
-----------------	------

PowerMate SX/20	CALL
-----------------	------

1,2,4,8Mb Upgrades	CALL
--------------------	------

ProSpeed 286, 386	CALL
-------------------	------

1, 4Mb Memory Upgrades	CALL
------------------------	------

ProSpeed SX/20	CALL
----------------	------

HP LaserJet Memory

For Models II, IID, IIP, III, IIID	CALL
------------------------------------	------

HP Computer Memory

For Vectra's, 9000 Series	CALL
---------------------------	------

Toshiba Laptops

2Mb Upgrades	\$240
--------------	-------

Models 1600,3100e,3100SX,	CALL
---------------------------	------

3200SX, 5100, 5200	CALL
--------------------	------

1, 2Mb Upgrades	CALL
-----------------	------

Models 1000SE, 1000XE	CALL
-----------------------	------

**5-YEAR WARRANTY! - 24-HOUR REPLACEMENT
IMMEDIATE DELIVERY! - SUPERIOR QUALITY & SERVICE**

Apple, AST, AT&T, Canon, DEC, Dell, Epson, SUN, Zenith, Others



SIGMA DATA

Scytherville Row • P.O. Box 1790 • New London, NH 03257
Established - 1980 NH (603) 526-6909 FAX (603) 526-6915

TOLL FREE

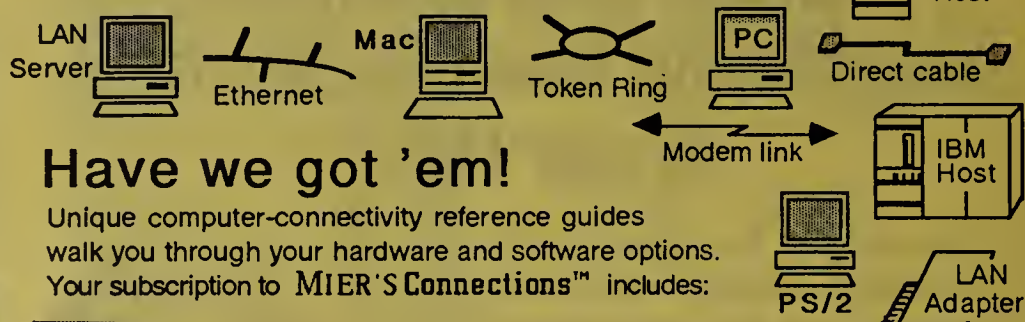
800-446-4525

VISA, MC, AMEX, COD, Qualified PO's

Circle Reader Service No. 14

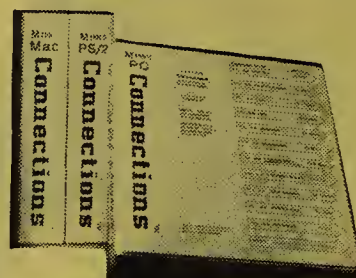
NETWORK REFERENCE SERVICE

Need connectivity answers?



Have we got 'em!

Unique computer-connectivity reference guides walk you through your hardware and software options. Your subscription to **MIER'S Connections™** includes:



- Quarterly updates
- Hundreds of connectivity scenarios — via LAN, phone line, direct cable, and more
- Detailed diagrams of all necessary software and hardware components
- Fax-in service for unanswered questions
- Technology overviews — track the trends

Call for detailed brochure and sample packet

609-275-7311

Fax 609-275-8813

Circle Reader Service No. 11

MIER Communications Inc.
99 Hightstown Rd., Princeton Jct., NJ 08550

MODEM

The Top End for Your Bottom Line

\$ 2395

Gandalf Introduces the LH19K Modem!



At any distance, the LH19K Modem offers exceptional features and fast transmission (19.2 Kbps) backed by proven technology from Gandalf, a market leader in data communications products and information systems.

The LH19K will reduce your costs by decreasing the number of leased lines and the amount of transmission equipment needed by providing dual channel capability. Asynchronous and synchronous operation and controlled carrier support operation are also included in the many features of the LH19K Modem-- the best value available in the market!

Gandalf's responsive customer service and technical support provide additional value to our products and are committed to your network running with maximum efficiency. The LH19K Modem and Gandalf Data Inc.— the top end for your bottom line.

For more information or to have a salesperson contact you, call 1-800-GANDALF.

gandalf

Circle Reader Service No. 10

NETWORK SCANNING & MONITORING

Cable Scanner

Pinpoint Network Cable Faults Fast!

The Scanner is a monitor, fault finder, cable locator and much more. Helps you pinpoint the location of shorts, opens or breaks. Its 32 character display reports the fault in plain English "short at 306 ft". With an oscilloscope, Scanner's high speed, pulse generating circuitry gives a detailed view of the entire LAN including transceiver, terminator and multiple faults.



- * Cable length measurements
- * Locate breaks, shorts, opens, bad crimps, etc.
- * LAN activity monitoring
- * Find cables in ceilings, walls, floors
- * Cable TV troubleshooting
- * Generate as-built drawings and specifications
- * Isolate faulty network interface cards
- * Very simple to operate



M-Test Equipment
P.O. Box 460008
San Francisco, CA 94146-0008

Call for Info

Outside CA: (800) 334-4293
Inside CA: (415) 861-2382
FAX: (415) 864-1076

Included is Tracer for locating exactly where in the floor, ceiling, wall or patch panel the cable lies. Cable Scanner, Tracer and Operators' Manual are only \$1495.

Circle Reader Service No. 12

NETWORK CABLES

No Double Talk: No Cross Talk!

Because the Mohawk LAN cable Wise Components stocks is double shielded. This means transmission is protected from any electrical noise... and with data pairs individually shielded, there can't be any cross talk.

Mohawk cable is tested by UL to ensure that all IBM specifications are met. It's also tested in accordance with EMI/RFI requirements for elimination of signal interference.

We stock many types of Mohawk cable for network systems, so call now to get Wise's superior service.

And there's no double talk about that, either!



800 543 4333

28 Henry Street
Greenwich, Conn. 06830

In Conn. 800 852 8557

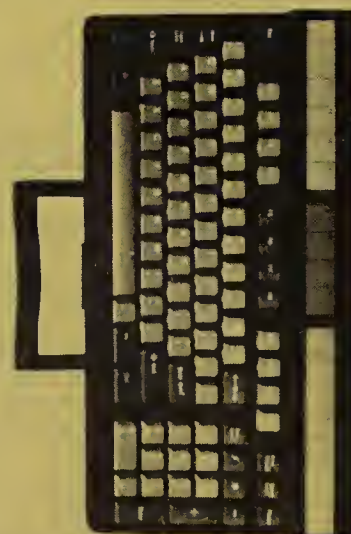
MOHAWK

Fax: 203 531 4859

Circle Reader Service No. 15

PC BASED PROTOCOL ANALYZER

A PC-based protocol analyzer that's serious about portability.



The LM1® is a PC-based protocol analyzer with a lot of get up and go. In a laptop, it weighs less than 15 pounds. You get maximum portability so you can zero in on problems in the shop or in the field. The remote option lets you monitor off-site lines, and captured data can be analyzed on any PC.

The LM1 gives you in-depth plain English decodes, BERT/BLERT testing, time stamping, and interactive simulation.

We're serious about performance and portability. Call us at (708) 574-3399.

Progressive Computing

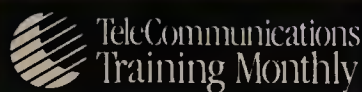
Progressive Computing, Inc.
814 Commerce Drive, Suite 101
Oak Brook, IL 60521 USA
(708) 574-3399 FAX (708) 574-3703
Circle Reader Service No. 13

LM1 is a registered trademark of Progressive Computing, Inc.

NETWORKING MARKETPLACE

TRAINING

DATA COMMUNICATIONS



VIDEO TAPE

Training & Industry News

New subject every month including:

- X.25 Protocol Analysis
- SDLC/SNA Protocol Analysis
- ISDN BRI "The Basics"
- Switched Telephone Circuit Basics
- T1-Carrier
- Network Topology
- Local Area Network Protocols
- DataCom Concepts (RS-232-C)
- Analog Line Measurements

Call for Demo Tape
(215) 598-3293



COMPUTER-BASED TRAINING

LAN
X.25
T1

FOR FREE CATALOG
OF ALL OUR COURSES
CALL

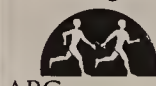
1-800-542-2242
(603) 433-2242

MAKE THE RIGHT PASS

ARX.25™

X.25 PORTING SOFTWARE
& PORTING SERVICES

- "C" Source modules
- HDLC/LAPB driver
- X.29, X.28/X.3 PAD
- Z85(C)30 Driver (DMA, PIO)
- Live PC implementations
- Porting & certification service



ARC
Advanced
Relay
Communications
INCORPORATED

Call for other X.25
or source modules

1420 E. 20th Ave.
Eugene, OR 97403
Tel (503) 345-9178
Fax (503) 484-0216

SPECIAL NETWORK SYSTEMS CORP

**** HYPERCHANNELS ****
Model A-400 WITH CABINET

Preowned equipment priced from 70% OFF LIST while current supply lasts
Guaranteed eligible for NETWORK SYSTEMS MAINTENANCE.



We are a full line DIGITAL EQUIPMENT CORP (DEC) dealer.
Call us anytime you want to BUY or SELL anything DEC.

MEMBERS



CARLSON COMPUTER INTERNATIONAL

11956 Bernardo Plaza Dr.
Suite 503
San Diego, Ca. 92128
800-334-7073
FAX (619) 486 9083

P O Box 10037
Springfield
Missouri 65808
800-548-7073
FAX (417) 725 5722

SOFTWARE

Open Systems & UNIX

- 270 UNIX System Exhibitors
- Biggest UNIX Event of the Year
- FREE Workshops Daily
- Complete Conference Program
- REGISTER NOW!

Call: **800-323-5155**
for complete details
(708-299-3131 in Illinois & outside U.S.)

UniForum
The International Conference of UNIX® Systems Users

January 22 - 24, 1991
INFOMART ■ Dallas, Texas

U
N
I
X

NETWORKING CAREERS

Need to Hire Quality Networking Professionals?

NETWORKING EMPLOYMENT SOLUTIONS delivers your detailed recruitment message directly to people with the qualifications YOU select, and pre-screens respondents with YOUR questions.

The result is qualified candidates who understand and meet your basic hiring criteria, at a FRACTION of what you usually spend on print advertising or recruiter's fees!

Not a Recruitment Agency.

Precision-targeted direct mail recruitment advertising plus candidate pre-screening, drawing on our exclusive current database of over 100,000 networking professionals nationwide.

Want to know how many candidates fit your specific hiring criteria? Call toll-free (800) 333-1666 and ask for an NES account executive. We'll do a preliminary search and show you the results at NO COST!

employment

SOLUTIONS
A Cooperative Service of Help Wanted
On-Line and Network World

TECHNOLOGY INTEGRATION PLANNING PROJECT LEADER



Allen-Bradley is an international leader at the forefront of computer integrated manufacturing. Backed by the strength of Rockwell International, we offer exceptional challenges and rewards to professionals who join us.

Broad technical expertise and excellent leadership skills will be vital as you research, evaluate and implement new integration technologies and procedures.

Other challenges include strategic planning and company-wide consultation for network systems including IBM mainframe, DEC VAX and UNIX.

At least 7-10 years progressive experience required with project management and supervisory exposure essential. Ideally, the most recent 3-5 years experience would be in a consultant/strategic planner role for telecommunications/technology integration. A Bachelor's degree in Business, Computer Science or Information Systems/Engineering required. MS preferred.

If you're excited about the prospect of enhancing a well-respected, integrated environment and have the intelligence, drive and spirit to make this a business reality, send your resume with salary history in confidence to: **Timothy R. Seifriz, Allen-Bradley Company, Headquarters Human Resources, 1201 South Second Street, Milwaukee, WI 53204.** We are an affirmative action/equal opportunity employer m/f/h/v. Women and minorities are encouraged to apply.



ALLEN-BRADLEY
A ROCKWELL INTERNATIONAL COMPANY

Where The Possible Becomes Practical.

OSI and GOSIP Product Analysis and Planning Guide 1990-1993

**A Network World/
Mier Communications Report**

OSI and GOSIP product strategies for over two dozen top vendors, including DEC, H-P, IBM, AT&T, NCR, Sun and others.

- *Vendor interoperation analysis
- *Product customization and configuration needs
- *GOSIP compliance needs
- *X.400 and FTAM support
- *Price trends

Single copy price: \$695
VISA, MasterCard or money orders

CONTACT:

Cheryl Tynan
Network World Special Reports
161 Worcester Road
Framingham, MA 01701

(800) 622-1108, In MA (508) 875-6400

NETWORKING RESOURCE DIRECTORY

Computers/Peripherals

Facsimile Machines

GammaLink..... 408-744-1430

Memory Upgrades

MEMORY UPGRADES

IBM, COMPAQ, AST, DEC, EPSON, HP
NEC, SUN, TOSHIBA, ZENITH, Others

5 Year Warranty - Immediate Delivery!



SIGMA DATA

New London, New Hampshire
CALL FOR OUR PRICE LIST
Established 1980

800 446-4525

Data Communications

Data Compression Equipment

RAD Data Communications Inc. . 201-587-8822

Diagnostic Test Equipment

Analog Line Testers

Navtel Inc..... 416-479-8090

3M Dynatel Systems Division ... 800-426-8688

Cable/Interface Testers

Navtel Inc..... 416-479-8090

Centralized Network Management Systems

AR Division, Telenex Corp..... 800-368-3261

Communication Devices, Inc..... 800-359-8561

DIGILOG/CXR 215-628-4530

Error-Rate Measurement Equipment

Navtel Inc..... 416-479-8090

3M Dynatel Systems Division ... 800-426-8688

Optical Fiber Test Equipment

3M Photodyne Inc 805-388-8378

Performance-Measurement Equipment

Navtel Inc..... 416-479-8090

3M Dynatel Systems Division ... 800-426-8688

Tektronix/LP Com..... 800-826-8675

Protocol Analyzers

SNA 3270/LU6.2 Tests

- 3800 + Validation & Load Tests
- SDLC and Token-Ring • PC-Based
- Specs and Source Coding Provided

Applied Computer Technology
Garland, TX (214) 271-6550

TEST YOUR NETWORK WITH THE BEST

OUR PROTOCOL ANALYZERS

- Test Networks at Higher Speeds
- Are Easier to Use with EASY-VIEW®
- Are More Powerful and Flexible
- Test ISDN, T1, SS#7, SNA, X.25,...



CALL 1-800-368-3261
(In Virginia 703-644-9190)
AR DIVISION OF TELENEX

Azure Technologies 800-233-3800

DIGILOG/CXR 215-628-4530

IBM MAINFRAME EMULATION SNA/3270 CERTIFICATION

- Over 500 preprogrammed QA tests to CERTIFY Controllers, Printers, Keyboards & Terminals
- LOAD & THROUGHPUT Testing
- NPSI/QLLC/X.25 Testing • PU2.1 Testing
- Token Ring Testing • LU6.2 Testing

GSOFT SYSTEMS, Inc.

7221 Mountindale Rd., Frederick, MD 21701
301-898-7973

Protocol Analyzers cont.

Hewlett-Packard Company

Colorado Telecomm Div 719-531-4414

Navtel Inc..... 416-479-8090

Testing Experts

- Protocol/Performance Analysis
- BERT & Digital Link Testing
- Analog Impairments Testing
- Breakout Boxes for all interfaces

(800) 2-NAVTEL
FAX: 416/475-6524

Navtel
Better by design

Tektronix/LP Com..... 800-826-8675

Protocol Analyzer

- Full Dual Port Operation
- 40-Megabyte Hard Disk Drive
- Capability to 256 Kbps

Call 1-800-826-8675 for full details

from

Tektronix
COMMITTED TO EXCELLENCE

205 Ravendale Drive, Mountain View, CA 94043

Telenex Corporation..... 800-222-0187

Protocol/Interface Simulators

GSOFT Systems, Inc..... 301-898-7973

Navtel Inc..... 416-479-8090

DSU/CSU

Anixter..... 800-343-5142

RAD Data Communications Inc. . 201-587-8822

Front-End Processors

Simpact Associates, Inc 619-565-1865

Microwave

Motorola Microwave 800-962-1826

Racon, Inc..... 800-426-5245

Modems

Limited Distance/Line Drivers

RAD Data Communications Inc. . 201-587-8822

High Speed (9.6kbps+)

Anixter..... 800-343-5142

Eastern Datacomm, Inc..... 201-262-9022

Western Datacom Co. Inc..... 800-262-3311

Fiber Optic

Canoga-Perkins Corp. 818-718-6300

RAD Data Communications Inc. . 201-587-8822

Multiplexers

Fractional T-1

AYDINCONTROLS

MULTIPLEXERS AND 4:1 TRANSCODERS

- Full and Fractional T1 Rates
- Toll Quality Voice / High Speed Data
- Handles 9.6 Kbps Modem and Group III FAX

Call 1-800-366-8889

414 Commerce Drive • Fort Washington, PA 19034-2602

Space and copy closing for next updated issue is December 20, 1990. Listing begins in January 14, 1991 issue and runs through the July 8, 1991 issue.

Fractional T-1 cont.

COASTCOM..... 415-825-7500

Optical Fiber

Anixter..... 800-343-5142

Canoga-Perkins Corp. 818-718-6300

RAD Data Communications Inc. . 201-587-8822

Statistical

Eastern Datacomm, Inc..... 201-262-9022

RAD Data Communications Inc. . 201-587-8822

Time Division

RAD Data Communications Inc. . 201-587-8822

T-1

Anixter..... 800-343-5142

Canoga-Perkins Corp. 818-718-6300

RAD Data Communications Inc. . 201-587-8822

Network Management Systems

AR Division, Telenex Corp. 800-368-3261

Communication Devices, Inc. ... 800-359-8561

Dynatech Communications 703-550-0011

Micro Technology..... 714-970-0300

Patching Equipment

AR Division, Telenex Corp. 800-368-3261

Telenex Corporation..... 800-222-0187

3M Private Network Products ... 800-745-7459

Thomas & Betts Corporation 908-685-1600

Switches

Data

Wise Components Inc..... 800-543-4333

Matrix

Datacomm Mgmt Sciences..... 203-838-7183

Dynatech Communications 703-550-0011

Telenex Corporation..... 800-222-0187

Packet

Amnet, Inc. 508-879-6306

OST, Inc. 703-817-0400

Port Selectors

Eastern Datacomm, Inc..... 201-262-9022

RAD Data Communications Inc. . 201-587-8822

Systems Integrators

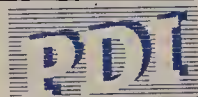


GLASGAL COMMUNICATIONS, INC.

We wrote the book on systems integration!

Providing **ALL** your network needs through optimized design, installation, integration and maintenance of products and services from over 130 top LAN and WAN manufacturers.

Worldwide Headquarters (201) 768-8082



(301) 840-0999
FAX: (301) 417-0593

Potomac Digital, Inc.

POTOMAC DIGITAL, INC. is a full service distributor and integrator of Networks, with an extensive inventory of WAN/LAN Products from:

AT&T PARADYNE
MICOM COMMUNICATIONS
NEC AMERICA, INC.
WELLFLEET
LANTRONIX
FIBER OPTIC PRODUCTS

For whatever you sell from A to Z,
you should place it under a heading
in *Network World's*
Resource Directory.

Systems Integrators cont.

StonyBrook Technologies, Inc. . 516-567-6060

Terminal Emulation Boards

Avatar Corporation..... 800-282-3270

Terminal Servers

Datability Software Systems 800-DIALDSS

VISTA Terminal Server

(1-800 DIAL-DSS;
in N.Y., 212-807-7800)

- * 8 to an Unprecedented 128 Ports
- * TCP/IP and LAT Compatible
- * 8 Hayes-Compatible *Internal* Modems
- * Full Function X.25 PAD

Local Area Networks

Bridges

Anixter..... 800-343-5142

CrossComm 508-481-4060

EICON TECHNOLOGY CORP. 514-631-2592

Interlink Computer Sciences 415-657-9800

RAD Data Communications Inc. . 201-587-8822

LAN/WAN Bridges

Advanced Relay Comm., Inc. 503-345-9178

Brouters

RAD Data Communications Inc. . 201-587-8822

Gateways

EICON TECHNOLOGY CORP. 514-631-2592

Interlink Computer Sciences 415-657-9800

Simpact Associates, Inc. 619-565-1865

StonyBrook Technologies, Inc. . 516-567-6060

Installation Services

Coluccio Associates Inc 212-908-5421

GE Network Service 800-726-4327

Solunet Inc..... 800-828-0151

Local Area Networks

Broadband Based

Anixter..... 800-343-5142

Ethernet Compatible

Anixter..... 800-343-5142

ANIXTER
Wiring Systems Specialists

Voice • Video • Data • Power

digital

Authorized Distributor
800-343-5142

DuPont-Electro-Optic Products 800-888-LAN1

Wise Components, Inc. 800-543-4333

Fiber Optic Based

Anixter..... 800-343-5142

10BaseT Systems

DuPont-Electro-Optic Products 800-888-LAN1

Token Ring

Anixter..... 800-343-5142

Token Ring Compatible

DuPont-Electro-Optic Products 800-888-LAN1

LAN Services

ExpertWatch

A unique service that monitors
your LANs 24 hrs a day, 7 days a
week so that you don't have to.

CrossComm Corp. (508) 481-4060

Have you moved?

To change your address of your subscription, simply attach your mailing label to this form, fill in your new address, complete the questions and return this form to us.

Fold Here



FREE subscription application

Why wait to read someone else's copy of *NETWORK WORLD*? You can have your own copy on your desk every week.

To apply for a FREE subscription, simply complete this subscription application form and return it to us.

Fold & Tape Here

Note!

Please answer ALL questions, sign and date the application. Incomplete forms cannot be processed or acknowledged. For those questions requesting quantities, please respond with specific numbers. The publisher reserves the right to limit the number of free subscriptions accepted in any business category.

Your name, title, company name and company address must appear in the space provided for your application to be processed, or you may affix your business card. Subscriptions cannot be mailed to a home address.

Thank You!

NETWORK WORLD

The Newsweekly of Enterprise Networking Strategies

Fold Here

PLACE
POSTAGE
STAMP
HERE

NETWORK WORLD

The Newsweekly of Enterprise Networking Strategies

P.O. BOX 1021
SOUTHEASTERN, PA 19398-9979



Qualification Form

Pass-Along Qualification Form

A. I Wish to Receive a FREE Subscription to *Network World*.

YES ☐ NO ☐

Signature _____ Date _____

Business Phone _____

B. Please Provide your Name, Title & Company Address.

DR./MR./MRS./MS. _____
First Name Middle Name Last Name

TITLE _____

COMPANY NAME _____

DIVISION/DEPARTMENT _____

STREET ADDRESS _____

CITY _____ STATE _____ ZIP _____

C. Please Answer ALL Questions, Sign & Date the Form.

1 Industry: (check one only)

- 01. ☐ Manufacturers (other than computer/communications)
- 02. ☐ Finance/Banking
- 03. ☐ Insurance
- 04. ☐ Real Estate
- 05. ☐ Healthcare Services
- 06. ☐ Legal
- 07. ☐ Hospitality
- 08. ☐ Retail/Wholesale Trade
- 09. ☐ Transportation
- 10. ☐ Utilities
- 11. ☐ Education
- 12. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
- 13. ☐ Government State/Local
- 14. ☐ Government Federal
- 15. ☐ Military
- 16. ☐ Aerospace
- 17. ☐ Consultants (independent)
- 18. ☐ Carriers
- 19. ☐ Interconnects
- 20. ☐ Manufacturers (Computer/Communications)
- 21. ☐ VAR/VAD/Systems House
- 22. ☐ Distributor, Computer Related
- 23. ☐ Distributor, Communications Related
- 24. ☐ Other _____

2 Job function: (check one only)

- 1. ☐ Networking Management (Responsible for both voice & data)
- 2. ☐ MIS Management (VP, Dir., Department Head)
- 3. ☐ Corporate Management (Chairman, President, Owner, General Manager, CEO, CIO, VP)
- 4. ☐ Data Communications Management (Responsible for data only)
- 5. ☐ Telecommunications Management (Responsible for voice only)
- 6. ☐ Financial Management
- 7. ☐ Engineering Management
- 8. ☐ Consultant (independent)
- 9. ☐ Other _____

3 What is the scope of your involvement in purchase decisions for Network/Communications products + services? (check one only)

- 1. ☐ Enterprise Wide (Organization/Subsidiary/Division)
- 2. ☐ Multi Enterprise (Consultants)
- 3. ☐ Department Wide

4 What is the total number of sites for which you have purchase influence?

- 1. ☐ 100+
- 2. ☐ 50 - 99
- 3. ☐ 20 - 49
- 4. ☐ 10 - 19
- 5. ☐ 2 - 9
- 6. ☐ 1

5 Your primary responsibility: (check one only)

- 1. ☐ Both Data + Voice
- 2. ☐ Data Networking Only
- 3. ☐ Voice Networking Only
- 4. ☐ None

6 Which transmission media do you use in your network: (check all that apply)

- Public:
- 01. ☐ Switched-Based (DDD, Wats, Megacom, etc.)
- 02. ☐ Leased Line (not including T-1)
- 03. ☐ T-1
- 04. ☐ Fractional T-1
- 05. ☐ T-3/SONET
- Private:
- 06. ☐ Broadband
- 07. ☐ ISDN
- 08. ☐ Satellite
- 09. ☐ Microwave
- 10. ☐ Fiber Optic

7 Is your network: (check all that apply)

- LOCAL AREA NETWORK
- 1. ☐ Local (within building)
- 2. ☐ Local (in a campus environment)
- WIDE AREA NETWORKS
- 3. ☐ International
- 4. ☐ National
- 5. ☐ Regional (several states)
- 6. ☐ Metropolitan

8 What is your network architecture? (check all that apply)

- 1. ☐ SNA
- 2. ☐ DECNET
- 3. ☐ OSI
- 4. ☐ GOSIP
- 5. ☐ MAP/TOP
- 6. ☐ TCP/IP
- 7. ☐ DCA (UNISYS)
- 8. ☐ OTHER _____

9 What is your LAN Operating System? (check all that apply)

- 01. ☐ 3COM (3+, 3+ open)
- 02. ☐ LOCAL TALK (APPLETALK)
- 03. ☐ BANYAN (VINES)
- 04. ☐ DCA (IRMALAN)
- 05. ☐ IBM (LAN Server)
- 06. ☐ IBM (PC LAN PROGRAM)
- 07. ☐ MICROSOFT (LAN MANAGER)
- 08. ☐ UNGERMAN BASS (NET/1)
- 09. ☐ NOVELL (NETWARE)
- 10. ☐ TOPS
- 11. ☐ PROTEON (PRONET)
- 12. ☐ OTHER _____

10 What is your LAN environment? (check all that apply)

- 1. ☐ 4M TOKEN RING
- 2. ☐ 16M TOKEN RING
- 3. ☐ ARCNET
- 4. ☐ ETHERNET
- 5. ☐ STARLAN
- 6. ☐ FDDI
- 7. ☐ LOCALTALK
- 8. ☐ OTHER _____

11 Which operating systems do you utilize? (check all that apply)

- 1. ☐ IBM DOS (VSE)
- 2. ☐ UNIX
- 3. ☐ OS/2
- 4. ☐ OS/2 Extended Edition
- 5. ☐ MVS
- 6. ☐ VM
- 7. ☐ VMS
- 8. ☐ XENIX
- 9. ☐ PICK
- 0. ☐ OTHER _____

12 Please indicate by vendor the number of mainframes/minicomputers installed in your network.

VENDOR	MAINFRAMES		MINIS
	A	B	
01. DEC			
02. IBM			
03. AMDAHL			
04. AT&T			
05. BULL HN IS			
06. NCR			
07. DATA GENERAL			
08. WANG			
09. HEWLETT PACKARD			
10. PRIME			
11. TANDEM			
12. UNISYS			
13. CONTROL DATA			
14. OTHER			

13 Please indicate by vendor the number of microcomputers/workstations:

- A. Presently installed in your network.
- B. The approximate quantity you plan to install in the next 12 months.

MICROCOMPUTER/ WORKSTATION/ VENDOR	PRESENTLY INSTALLED		PLAN TO INSTALL NEXT 12 MONTHS
	A	B	
01. PCs based on 80286 chip			
02. PCs based on 80386 chip			
03. PCs based on 80486 chip			
04. 8086/8088			
05. Macintosh			
06. RISC-based workstations			
07. UNIX-based workstations			

14 What is your planned PC standard? (check all that apply)

- 1. ☐ EISA
- 2. ☐ MCA
- 3. ☐ NUBUS (MACINTOSH)

15 For which areas outside of the U.S. do you have purchasing influence? (check all that apply)

- 1. ☐ Europe
- 2. ☐ Asia
- 3. ☐ South America
- 4. ☐ Australia
- 5. ☐ Middle East

16 Check ALL that apply in columns A and B

- A) I am presently involved in the purchase process for the following products/services:
- B) I plan to purchase the following products/services in the next 12 months:

Presently Involved	Plan to Purchase
A	B
LOCAL AREA NETWORKS:	
01. ☐	☐ Local Area Networks
02. ☐	☐ LAN Servers
03. ☐	☐ LAN Services
04. ☐	☐ Cables, Connectors, Baluns
05. ☐	☐ Bridges, Routers, Gateways
06. ☐	☐ UPS
07. ☐	☐ LAN Storage Devices
COMPUTERS/PERIPHERALS:	
08. ☐	☐ Micros
09. ☐	☐ Minis
10. ☐	☐ Mainframes
11. ☐	☐ Front End Processors
12. ☐	☐ Terminals
13. ☐	☐ Laptops
14. ☐	☐ Printers
15. ☐	☐ Work Stations
16. ☐	☐ Cluster Controllers

(continued on next column)

Presently Involved	Plan to Purchase
A	B
SOFTWARE:	
17. ☐	☐ Network Management
18. ☐	☐ Micro to Mainframe
19. ☐	☐ Network Security
20. ☐	☐ Call Accounting
21. ☐	☐ Distributed DBMS
22. ☐	☐ Communications Software
23. ☐	☐ Applications Software
24. ☐	☐ Network Operating Systems Software
25. ☐	☐ EDI Software
26. ☐	☐ E-Mail Software
DATA COMMUNICATIONS:	
27. ☐	☐ Modems (over 9.6kbps)
28. ☐	☐ Modems (under 9.6kbps)
29. ☐	☐ T-1 Multiplexers
30. ☐	☐ T-3 Multiplexers
31. ☐	☐ Fractional T-1 Multiplexers
32. ☐	☐ Data Switches
33. ☐	☐ Matrix Switches
34. ☐	☐ Packet Switches
35. ☐	☐ Protocol Converters
36. ☐	☐ Network Management Systems
37. ☐	☐ Terminal Emulation Boards
38. ☐	☐ Facsimile Machines
39. ☐	☐ Diagnostic Test Equipment
40. ☐	☐ DSU/CSU
41. ☐	☐ Data Security
42. ☐	☐ Data Compression Equipment
43. ☐	☐ Network Adapter Boards
44. ☐	☐ Microwave
45. ☐	☐ Messaging Software
TELECOMMUNICATIONS:	
46. ☐	☐ PBXs (over 1000 lines)
47. ☐	☐ PBXs (200 - 1000 lines)
48. ☐	☐ PBXs (under 200 lines)
49. ☐	☐ Key Systems
50. ☐	☐ Automatic Call Distributors
51. ☐	☐ Voice Messaging Systems
52. ☐	☐ Video Conferencing Systems
SERVICES:	
53. ☐	☐ Switched Voice
54. ☐	☐ Dedicated Leased Line
55. ☐	☐ T-1
56. ☐	☐ T-3
57. ☐	☐ Digital Data
58. ☐	☐ Packet Switched
59. ☐	☐ Centrex
60. ☐	☐ Central Office Lan
61. ☐	☐ Satellite
62. ☐	☐ On-Line Information
63. ☐	☐ ISDN
64. ☐	☐ EMail
65. ☐	☐ VSAT

17 Estimated value of networking equipment and services:

A: Which you helped specify, recommend or approve in the last 12 months?

B: Which you plan to help specify, recommend or approve in the next 12 months?

- A
- 1. ☐ \$100 million and over
- 2. ☐ \$50 - \$99.9 mill.
- 3. ☐ \$25 - \$49.9 mill.
- 4. ☐ \$20 - \$24.9 mill.
- 5. ☐ \$10 - \$19.9 mill.
- 6. ☐ \$5 - \$9.9 mill.
- 7. ☐ \$1 - \$4.9 mill.
- 8. ☐ \$500,000 - \$999,999
- 9. ☐ Under \$500,000

18 Estimated gross annual revenue of your entire company/institution: (check one only)

- 1. ☐ over \$10 billion
- 2. ☐ \$1 to \$9.9 bill.
- 3. ☐ \$500 to \$1 bill.
- 4. ☐ \$100 to \$499.9 mill.
- 5. ☐ \$50 to \$99.9 mill.
- 6. ☐ \$10 to \$49.9 mill.
- 7. ☐ \$5 to \$9.9 mill.
- 8. ☐ under \$5 mill.

19 Estimated number of employees for your entire corporation:

- 1. ☐ over 10,000
- 2. ☐ 5,000 - 9,999
- 3. ☐ 2,500 - 4,999
- 4. ☐ 1,000 - 2,499
- 5. ☐ 500 - 999
- 6. ☐ under 500

20 Which of the following ISDN products do you plan to purchase in the next 12 months? (check all that apply)

- 1. ☐ Basic Rate Interface Terminal Adapters
- 2. ☐ Primary Rate Interface Equipment
- 3. ☐ Voice/Data terminals
- 4. ☐ Voice-only terminals
- 5. ☐ Data-only terminals

21 From which of the following vendors will you consider buying your PBX/Central Office Switch? (check all that apply)

A	B
PBX	COS
A ☐	☐ AT&T
B ☐	☐ ALCATEL
C ☐	☐ ERICSSON
D ☐	☐ FUJITSU
E ☐	☐ HARRIS
F ☐	☐ HITACHI
G ☐	☐ ROLM
H ☐	☐ INTECOM
I ☐	☐ MEMOREX TELEX
J ☐	☐ MITEL
K ☐	☐ NEC
L ☐	☐ NORTHERN TELECOM
M ☐	☐ SAMSUNG
N ☐	☐ SIEMENS
O ☐	☐ STROMBERG-CARLSON
P ☐	☐ TOSHIBA
Q ☐	☐ OTHER _____

NETWORK WORLD

The Newsweekly of Enterprise Networking Strategies
An IDG Publication

NETWORKING RESOURCE DIRECTORY

Lan Services cont.

LAN/Mind, Inc. 800-325-5267

LAN Test/Management Devices

DIGILOG/CXR 215-628-4530
Hewlett-Packard Company
Colorado Telecomm Div..... 719-531-4414
Tektronix/LP Com..... 800-826-8675

Routers

Anixter..... 800-343-5142
Interlink Computer Sciences 415-657-9800

Security

Encryption/Decryption Devices

GN Telematic, Inc. 508-667-8644

Software

Application Development Tool Kit

Proteo Software Inc..... 800-668-6716

Cable Management

Network Facilities..... 612-934-2655

Communications

Simpact Associates, Inc. 619-565-1865



FAXGate™
Facsimile Gateway for IBM Mainframes



FILEGate™
File Transfer Gateway for IBM Mainframes

Teubner & Assoc. 800-343-7070 405-624-2254

E-Mail/Messaging

Notework Corporation 617-734-4317

Facilities Management

CHI/COR Info. Management 312-454-9670
DIGILOG/CXR 215-628-4530
Telco Research Corporation 800-48T-ELCO
XTEND COMMUNICATIONS 212-725-2000

Micro-to-Mainframe

EICON TECHNOLOGY CORP.... 514-631-2592
StonyBrook Technologies, Inc.. 516-567-6060

Network Management

Communication Devices, Inc..... 800-359-8561
CrossComm 508-481-4060
DIGILOG/CXR 215-628-4530

Storage Devices & Media

Computer Room Equipment

Controller Stacking Frames
Data Connections, Inc..... 919-668-1077

Structured Wiring Systems

Baluns

Anixter..... 800-343-5142
RAD Data Communications Inc.. 201-587-8822
The Siemon Company 203-274-2523
Thomas & Betts Corporation.... 908-685-1600



TRANSITION
ENGINEERING, INC.

The most complete selection of UTP and STP Baluns shipped from stock.

3270 • AS/400-3X • Arcnet • Ethernet

Type 3 Media Filters • Panels • Testers
Active Hubs • Passive Hubs • Adapters

(800) 325-2725 (612) 941-7600

Made in USA
= Higher Quality + Better Service + Wider Selection

Baluns cont.

Wise Components, Inc. 800-543-4333

Cables

Coax
Anixter..... 800-343-5142
Wise Components, Inc..... 800-543-4333

Fiber Optic

Anixter..... 800-343-5142

CHROMATIC

TECHNOLOGIES, INC.

31 Hayward Street, Franklin, MA 02038
508/520-1200 * FAX 508/520-0698
The most valuable fiber optic cable.

Siecor Corporation..... 704-327-5189
3M Private Network Products... 800-745-7459
Wise Components, Inc..... 800-543-4333

Twisted Pair

Anixter..... 800-343-5142
Wise Components, Inc..... 800-543-4333

Connectors

Anixter..... 800-343-5142
3M Private Network Products... 800-745-7459
Thomas & Betts Corporation.... 908-685-1600
Wise Components, Inc..... 800-543-4333



MOD-TAP
Total Wiring Solutions
from
YANKEE

1-800-365-9720 FAX: 603-625-4915

Cross Connect Blocks

Anixter..... 800-343-5142
3M Private Network Products... 800-745-7459
The Siemon Company 203-274-2523

Wiring Concentrators

Anixter..... 800-343-5142

Support Equipment

Power Distribution/ Equipment Protection

BATTERY BACK-UP for NETWORKS
BEST PRICES
1-800-433-2288 The PURSUIT Corp.

Secondary

The Siemon Company 203-274-2523

UPS

3M Private Network Products... 800-745-7459

Support Services

Consulting



Business Software Inc.
Specialists in multi-media network documentation

- Setup • Maintenance
- Training • Network Planning

Call: (212) 753-5333

LAN/Mind, Inc. 800-325-5267
Multi-Tech Communications 201-627-2518

PRISM TECHNOLOGY INC.

NetWare 386/286 Consulting
Client/Server Applications
Sales & Installation

 **NOVELL** (617) 241-0451
AUTHORIZED RESELLER

Telco Research Corporation 800-48T-ELCO
XTEND COMMUNICATIONS 212-725-2000

Educational Training Services

Data Communications

Business Communications Rev.708-986-1432
ICA..... 800-422-4636

E-Mail Training

Westcon Training Centers..... 800-873-6040

IBM: SAA/SNA

Galaxy Consultants..... 408-354-2997

LAN

Business Communications Rev.708-986-1432
ICA..... 800-422-4636
Westcon Training Centers..... 800-873-6040

Novell

LAN/Mind, Inc. 800-325-5267
PTXI..... 800-783-PTXI
Westcon Training Centers..... 800-873-6040

Telecommunications

Business Communications Rev.708-986-1432
ICA..... 800-422-4636

3COM

PTXI..... 800-783-PTXI

Installation Services

GE Network Service 800-726-4327

Novell Sales and Service

Installation - cabling - maintenance

Novell Authorized Training

CNE Training

Network Systems & Services
160 5th Ave. NYC - 212/691-2680



PCC
Pacific Coast Cabling, Inc.

Installation Specialists

Communications Cabling & Equipment
Data, Voice & Video Prewire Services

LANs WANS

Serving Southern California Since 1985
21610 Lassen St., Chatsworth, CA 91311
(818) 407-1911 Lic# 486194

Solunet, Inc..... 800-828-0151

Lease/Resale Organization

SOURCE Telecommunications.. 214-450-2700

VSAT Installations

DOWNL INC.

NATIONAL VSAT INSTALLATIONS GROUP
1777 SOUTH BELLAIRE STREET • DENVER, CO 80222
(303) 756-0031 FAX (303) 756-9011

Telecommunications/ Voice

Call Accounting

DIGILOG/CXR 215-628-4530
Telco Research Corporation 800-48T-ELCO
XTEND COMMUNICATIONS..... 212-725-2000

Centrex

CENTREX SYSTEM?



CONSOLE
YOURSELF WITH
TONECOMMANDER

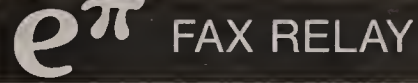
A family of answering consoles. Please call: 1-206-883-3600 1-800-524-0024

Key Systems

SOURCE Telecommunications.... 214-450-2700

Fax Processing Systems

Biscom 800-477-2472



eπ FAX RELAY

The FR-100 FAX RELAY connects a Group III facsimile machine via a PBX extension to the data port of a multiplexer. The FR-100 puts fax transmission over your dedicated data network using only 9600 or 4800 bps.

(408) 973-9800
Entropic Speech, Inc.

The FAX Group..... 619-792-6400

GammaLink..... 408-744-1430

ISDN Products

Anixter..... 800-343-5142
Hewlett-Packard Company
Colorado Telecomm Div..... 719-531-4414

PBXs (under 200 lines)

SOURCE Telecommunications.... 214-450-2700

Microwave Transmitters/Receivers

Motorola Microwave 800-962-1826
Racon, Inc..... 800-426-5245

Voice Response

Syntellect Inc. 602-789-2800

VSAT Customer Premises

Equipment

Scientific-Atlanta, Inc.
Private Networks Business 407-255-3000

Transmission Services

Dedicated Lease Line

Communications Transmission. 800-272-9CTI

Facsimile

GammaLink..... 408-744-1430

Microwave

FCC Licensed Digital Microwave
Carrier • Bypass • Alternate Access
• Disaster Recovery/Diversity

(212) 509-5115 **LOCATE**
17 Battery Place, Suite 1200, NY, NY 10004

Motorola Microwave 800-962-1826

Racon, Inc..... 800-426-5245

Packet Switching

Dynatech Communications 703-550-0011
StonyBrook Technologies, Inc.. 516-567-6060

VSAT

CSA-VSAT Consultants 408-996-0585
GTE Spacenet Corporation 703-848-1000
Scientific-Atlanta, Inc.
Private Networks Business 407-255-3000

Wide Area Networks

Concentrators

Amnet, Inc. 508-879-6306

Network Switches

Amnet, Inc. 508-879-6306

For more information, or a complete list of headings, call Eleni Brisbois, at 1-800-622-1108 or fax 508-651-1853. Mailing address Network World, Eleni Brisbois/Resource Directory, 161 Worcester Road, Framingham, MA 01701-9172.

Get AT&T EDI. Because if one



Here at AT&T, we know that an Electronic Data Interchange service is only as good as its component parts. That's why we've designed each part of AT&T EDI to be equally strong. Why does our EDI stand up to your business' needs better than any other? It's a matter of simple addition.

Network

AT&T EDI is part of the AT&T Global Messaging Network. This network is based on our patented "Message Transfer Architecture" that uses CCITT MHS X.400, the internationally accepted messaging standard. So you can easily link up with trading partners around the world. And you can send and receive encrypted data, ensuring the security of sensitive documents. Further-

more, the AT&T Global Messaging Network can be used not only for EDI but for electronic mail and enhanced fax.

+ Systems

Our unique open architecture means that our EDI can work with whatever systems you have, whether they're mainframe, mini or PC-based. We have the software and systems for you and your trading partners, no matter what size they are or how advanced they may be. And with our open architecture, we make it easy for your system to adapt as your business grows.

+ Support

From the day you start talking with us about EDI, you can get an extensive range of support services. From

piece is out of balance, well, you know what'll happen.



customized trading partner conferences and implementation seminars to on-site technical support. You also get the benefit of our extensive experience with EDI. After all, we've been using EDI here at AT&T for more than ten years.

=The best EDI.

So get the most advanced EDI network there is, with the most flexible systems and unsurpassed support. AT&T EDI. Because, on balance, the best EDI is the sum of superior parts.

Quality. Another AT&T advantage.

For more information, call your AT&T Account Executive or 1 800 321-6747, Ext. EDI.



AT&T

The right choice.

NETWORK WORLD

Electronic data interchange services

Company	Product name	Service type	Industry focus	Data standards supported	Protocols and speeds supported	Access	Public network interconnection	Dial out service	Reports	Additional features
AT&T Bridgewater, N.J. (800) 321-6747 Ext. 334	AT&T EDI	EDI mailbox; point-to-point service; EDI to mail or fax available 1991; E-mail; E-mail text to voice; EDI and E-mail binary file transfer (1)	Aerospace, petroleum, finance, telecommunications	ANSI X12, TDCC, WINS, AIAG, VICS	Synchronous: 3780 RJE or 3770 SNA at 4.8K and 9.6K bit/sec; asynchronous: 1,200 and 2,400 bit/sec for Fmodem, Xmodem and Ymodem; 4.8K for Unix UUCP, and 19.2K bit/sec on special bid; X.25, X.400 (P0, P2); higher speeds on special bids (2)	IBM PC (also with Unix); Apple Computer, Inc. Macintosh (for E-mail only); minicomputer; mainframe	CDC; GEIS; Kleinschmidt; TranSettlements; BT Tymnet; Sterling Software; Sears Communications; Harbinger; AT&T ISTE Global Messaging Service, Ltd.; General Motors/Electronic Data Systems (3)	Yes	Standard billing, detail billing, mailbox status report, delivery notification (4)	Integrated messaging (X.400-based): from one account, one user ID, in one session, users can send and receive EDI, E-Mail and enhanced fax messages, provided processor is fax-capable; full line of support services, including round-the-clock hot line; trading partner implementation programs, technical seminars, and trading partner conferences; full support for any X.400-based EDI (P0, P2) with any industry standard envelope interface; message screening: positive (only people on list) and negative (anyone not on list); hierarchical billing structure (four levels); EDI on-line administrative interface; dial-out asynchronous transmission; split billing (may be different for send and receive)
BT Tymnet, Inc. San Jose, Calif. (800) 872-7654	EDI*Net Service	EDI mailbox; E-mail	Grocery, banking, telecommunications, distribution, manufacturing	ANSI X12, TDCC, WINS, AIAG, VICS, EDIFACT, Tradecom	Asynchronous: dial-up 1,200, 2,400 bit/sec with X.PC; BSC: RJE 2780/3780 dial-up, command driven 2780/3780 dial-up, in-bound listening for non-customers; UCS, immediate out-dial; UCS, time-based out-dial; 2,400 and 4.8K bit/sec; X.25 dedicated leased lines	IBM PC (also with Unix), Macintosh (for E-mail only), minicomputer, mainframe	CDC; GEIS; RAILINC; Kleinschmidt; General Motors/Electronic Data Systems; Ford Motor Co.; AT&T; Chrysler Corp.; K mart Corp.; Sterling Software; CompuServe, Inc.; Sears Communications; Harbinger; IBM; TranSettlements; Userbase Systems, Inc.; Union Pacific Technologies Co.; Western Union Corp.	Yes	Invoice summary; send summary; receive summary; transaction detail report; message status — on-line report (5)	Envelope only transaction: header and trailer conversion between ANSI X12, TDCC and UCS standards; document copy; second recipient
Control Data Corp. Lakewood, Ohio (800) 321-2012	REDINET Services	EDI mailbox; data standards translation; point-to-point service; EDI to mail or fax; E-mail	Retail, manufacturing, distribution	ANSI X12, TDCC, WINS, AIAG, VICS, EDIFACT, any public or private formats	Asynchronous and BSC, SNA, X.25, RJE at speeds of 300 to 9.6K bit/sec	IBM PC, minicomputer, mainframe	Virtually all public networks	Yes	Status and management reports (6)	REDI-Translator (mainframe translator software); REDI-Map (mapping software); REDI-Micro (personal computer-based EDI software); dial-out services; trading partner programs; EDI consulting; education
General Electric Information Services Rockville, Md. (800) 334-5669	EDI* EXPRESS Service	EDI mailbox; data standards translation; point-to-point service; E-mail; document/interchange level; electronic funds transfer	Automotive, banking, transportation, petroleum, chemical, retail	ANSI X12, TDCC, WINS, AIAG, VICS, EDIFACT	Asynchronous: 1,200 to 9.6K bit/sec; BSC: 2780/3780, 1,200 to 4.8K bit/sec; SNA 3770: dial-up at 2,400 to 4.8K bit/sec; LU 6.2: 1,200 to 9.6K bit/sec; X.400: 1,200 to 4.8K bit/sec; Systems Network Interconnections up to 56K bit/sec	IBM PC, minicomputer, mainframe	CDC, RAILINC, Telecom Canada; Kleinschmidt; AT&T; Agri-Data Systems, Inc.; Sterling; CompuServe; Sears Communications; Harbinger; IBM; TranSettlements; Union Pacific Technologies; Western Union; Informatics, Inc.; BT Tymnet	Yes	Billing summary report; sender status report; receiver status report; unretrieved documents report; trading partner activities report; on-line error messages report	EDI*PC: a software package that supports EDI*Express for the transmission and receipt of EDI messages; EDI*Central: a translation and management system designed to run on an IBM mainframe; customer-originated electronic payments system: an electronic payment instruction system; Design*Express: a system that provides electronic acceptance, storage, delivery of engineering design/manufacturing data in different formats; UPC*Express Catalog: provides for management and distribution of UPC numbers and descriptive information; EDI implementation services
Harbinger*EDI Services Atlanta (800) 367-4272	Harbinger* EDI Services	EDI mailbox; point-to-point service, E-mail	Electric utilities, telecommunications, financial services/-electronic funds transfer, manufacturing, chemical, electronics, transportation, metals, aerospace, health care	ANSI X12, TDCC, WINS, AIAG, UCS, VICS, NACHA	Asynchronous: 1,200, 2,400, 4.8K and 9.6K bit/sec (MNP, Xmodem, Ymodem); X.25; BSC: 2780/3780 at 2,400 and 4.8K bit/sec; 3770 SNA at 4.8K and 9.6K bit/sec	IBM PC, Macintosh, minicomputer, mainframe	All public EDI networks	Yes	Document receipt; document delivery; trading partner profile; document acknowledgment and reconciliation; monthly status; billing (7)	Private network software is available as a turnkey solution, including installation, testing and customer support system
Infonet Services Corp. El Segundo, Calif. (213) 335-2872	Notice edi	EDI mailbox; data standards translation; point-to-point service; E-mail	International companies	ANSI X12, TDCC, WINS, AIAG, VICS, TDI, EDIFACT	Asynchronous at 300 to 2,400 bit/sec; BSC 3780 at 2,400 to 4.8K bit/sec (8)	IBM PC, minicomputer, mainframe	118 networks worldwide	Yes	Standard billing report; standard status report; optional session reports; optional session register (billing) reports; optional notification of delivery; incoming/outgoing interchange status report (9)	Worldwide local support; 24-hour worldwide hot line; global trading partner management program; customized data entry screens
Kleinschmidt, Inc. Deerfield, Ill. (708) 445-1000	EDI Services	EDI mailbox; data standards translation; point-to-point service; EDI to mail or fax	Transportation, electrical, general manufacturing, chemical and petrochemical, retail	All public and private standards	Adapts to suit the transmission needs of any customer	IBM PC, Macintosh, minicomputer, mainframe	Offers interconnection to any company willing to interconnect with Kleinschmidt	Yes	Offers customer-specified reports, pricing defined by reports needed	Custom EDI networking solutions for clients

AIAG = Automotive Industry Action Group
 BSC = Binary Synchronous Communications
 EDIFACT = EDI for Administration, Commerce and Transport
 GEIS = General Electric Information Services
 MNP = Microcom Networking Protocol
 NACHA = National Automated Clearing House Association
 RJE = Remote job entry

TDCC = Transportation Data Coordinating Committee
 TDI = Trading data interchange
 UCS = Uniform Communications Standard
 UPC = Universal Product Code
 VICS = Voluntary Interindustry Communications Standard
 WINS = Warehouse Information Network Standard

FOOTNOTES:

- (1) Data standards translation due in 1991.
- (2) AT&T expects to offer P-EDI in 1991.
- (3) AT&T is testing interconnection with the following public networks: IBM, Western Union and General Motors/Electronic Data Systems.
- (4) AT&T's report pricing is as follows: standard bill, free; detail billing to an electronic file, variable; monthly mailbox status reports, message delivery rate; delivery notification, EDI message and EDI notification, 40 cents for all three.
- (5) All reports except message status report are standard and free of charge.
- (6) Reports provided at no additional charge.
- (7) All reports optional; \$200 charge to set up each report. Regular transaction fees apply afterward.
- (8) Higher speeds available for dedicated connections.
- (9) Reports are priced at standard usage rates.

This chart includes a representative selection of vendors of EDI services. These vendors may offer other EDI services, and other vendors not included may offer a full range of competitive services. Both IBM and Bell Atlantic were unable to provide product information prior to publication deadlines.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

NETWORK WORLD

Electronic data interchange services (continued)

Company	Product name	Service type	Industry focus	Data standards supported	Protocols and speeds supported	Access	Public network interconnection	Dial out service	Reports	Additional features
RAILINC Corp. Washington, D.C. (202) 639-5500	RAILINC Network Service	EDI mailbox; point-to-point service	Rail and related industries	ANSI X12, TDCC	Asynchronous: 1,200 bit/sec; dial 3780: 2,400/4,800 bit/sec; point-to-point SNA LU 6.2; point-to-point 3780: 2.4K through 19.2K bit/sec	IBM PC, Macintosh, minicomputer, mainframe	BT Tymnet; GEIS; Harbinger; Kleinschmidt; CDC; TranSettlements; Western Union; Infonet Services Corp.	No	Standard billing reports	TRAIN II reporting, universal machine language equipment register
Sears Communications Co. Schaumburg, Ill. (800) 366-2722	Sears EDI Services	EDI mailbox, data standards translation, point-to-point service, E-mail, financial EDI	Retail, others	ANSI X12, TDCC, WINS, AIAG, VICS	Asynchronous: 2,400 bit/sec; BSC: 2780/3780 dial-in/dial-out at 2,400, 4.8K or 9.6K bit/sec; BSC: 2780/3780 dedicated line at 4.8K or 9.6K bit/sec; SNA 3770 RJE dial-in/dial-out at 4.8K or 9.6K bit/sec; SNA 3770 RJE dedicated line at 4.8K, 9.6K, or 14.4K bit/sec; SNA gateway using VTAM dedicated line (LU 6.2)	IBM PC, minicomputer, mainframe	AT&T; BT Tymnet; CompuServe; GEIS; Harbinger; IBM; Kleinschmidt; Sterling Software; CDC; TranSettlements; Western Union; Infonet	Yes	None	Custom Hub Program - EDI assistance program; intracompany services such as SNA data transport, file transfer and bulk data transport, trading partner implementation
Shipnet Systems, Inc. Lisle, Ill. (708) 963-4000	Shipnet Service	Data standards translation, third-party central data base	Grocery and food-related businesses, chemical, transportation	ANSI X12, TDCC, proprietary	Asynchronous at 1,200 and 2,400 bit/sec; BSC 2780/3780 at 2,400 and 4.8K bit/sec; LU 6.2, SDLC at 4.8K and 9.6K bit/sec; CICS InterSystem Communications	IBM PC, minicomputer, mainframe	Sears Communications; Sprint Data Group, IBM Information Network	Yes	Carrier turnaround report; carrier pickup and delivery and performance; carrier detail and summary by consignee; exception report; carrier performance; carrier detail by shipper (10)	Data compliance service, application software, consulting, training, technical support
Sterling Software, Inc. ORDERNET Services Division Columbus, Ohio (614) 793-7000	ORDERNET	EDI mailbox, data standards translation, point-to-point service, EDI to mail or fax	Health care, grocery and food-related businesses, retail, transportation	ANSI X12, TDCC, WINS, AIAG, VICS, EDIFACT	Speed: up to 56K bit/sec; protocols: BSC 3741, 2780, 3780 and HASP multileaving; asynchronous MNP; SNA 3770 LU 1	IBM PC, minicomputer, mainframe	IBM; GEIS; Kleinschmidt; CDC; BT Tymnet; CompuServe; Harbinger; Western Union	Yes	Daily processing summary; transmission confirmation; compliance editing; billing detail; EDI message status (11)	None
TranSettlements, Inc. Atlanta (404) 996-8109	TranSend	EDI mailbox, data standards translation, point-to-point service, EDI to mail or fax	Transportation	ANSI X12, TDCC, WINS, AIAG, VICS, EDIFACT	Asynchronous: 300 to 4.8K bit/sec, direct connect to 56K bit/sec, 3780, others as required; BSC to 9.6K bit/sec, SNA to 9.6K bit/sec	IBM PC, Macintosh, minicomputer, mainframe; others are protocol-dependent	CDC; GEIS; RAILINC; Kleinschmidt; General Motors/Electronic Data Systems; Ford; AT&T; BT Tymnet; Sterling Software; CompuServe; Sears Communications; Harbinger; IBM; Sprint Data Group; Userbase Systems; VOCAM, Inc.; Western Union	Yes	Billing, mailbox status, delivery status, access control, custom reporting (12)	None
US Sprint Communications Co. Reston, Va. (703) 689-6000	SprintEDI	EDI mailbox, data standards translation, point-to-point service, EDI to mail or fax, E-mail, telex to fax	Proprietary	ANSI X12, TDCC, WINS, AIAG, VICS, EDIFACT	BSC 2780/3780/3770; 1,200, 2,400, 4.8K, 9K, 19.2K, 56K bit/sec	IBM PC, mainframe, minicomputer	GEIS; General Motors; Chrysler; Ford; AT&T; Sterling; BT Tymnet; IBM; Sears Communications	Yes	Standard billing report; mailbox/trading partner status report; notification of delivery	None

AIAG = Automotive Industry Action Group
BSC = Binary Synchronous Communications
EDIFACT = EDI for Administration, Commerce and Transport
GEIS = General Electric Information Services
MNP = Microcom Networking Protocol

RJE = Remote job entry
TDCC = Transportation Data Coordinating Committee
VICS = Voluntary Interindustry Communications Standard
WINS = Warehouse Information Network Standard

FOOTNOTES:

- (10) All reports are standard. Custom reports designed with user and specifically priced are also available.
(11) All reports but compliance editing are standard and free of charge. Compliance editing costs 5 cents per interchange.
(12) All reports except custom reports are free of charge.

This chart includes a representative selection of vendors of EDI services. These vendors may offer other EDI services, and other vendors not included may offer a full range of competitive services. Both IBM and Bell Atlantic were unable to provide product information prior to publication deadlines.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

(continued from page 41)

a substantial number of companies use EDI, the EDI system cannot be effective. Electronic mail systems suffered a similar problem in their infant stages.

■ **The real and imaginary costs of EDI.** For larger hub companies, EDI can be expensive to implement. A truly integrated EDI system involves upgrading internal systems, such as purchasing, invoicing, order taking and inventory, to take advantage of the latest EDI technology. Software, training and education, trading partner programs and usage create additional costs.

These expenses can be recouped over the long run, but the lack of partner companies with which to communicate via EDI in the short term can turn these im-

plementation costs into a stumbling block.

■ **False perceptions.** Many smaller companies consider EDI a "big company" program with big company expenses. For the most part, this categorization is unfair.

EDI suppliers have developed low-cost, personal computer-based systems with the small user in mind. In addition, as mentioned earlier, many hub companies work with EDI network providers to encourage smaller companies to sign up for EDI services. These incentives include free training and education seminars or discounts on software.

In some cases, where the hub company wants to sign up its customers for an EDI program, the hub firm may even offer financial

help to defray the costs of implementing EDI.

■ **"You first" syndrome.** Many companies are waiting for the companies with which they trade to implement EDI first. This creates a "chicken and egg" situation, slowing down the growth of EDI overall.

■ **Internal resistance from employees.** EDI represents a change in the way tasks such as order processing, invoicing and inventory control are performed. Workers must be retrained to use the new system. In addition, the decreased need for clerical labor that is a by-product of EDI may promote workers' fears about job security.

■ **Confusing standards.** For companies to communicate via EDI, there must be a standard to

define the layout of the documents to be transmitted. Due to the industry-specific growth of EDI, the marketplace currently has a multiplicity of EDI standards.

These separate standards issues are now beginning to be resolved by ANSI, which has proffered a generic X12 standard for interindustry electronic exchange of business transactions.

Industries using EDI have begun to adopt the ANSI X12 format, but their particular standards are embedded in a user base that is slow to conform. Overall, the differences among standards can make it difficult to implement EDI, especially for companies that plan to use the technology in several industries.

■ **No standards.** Some indus-

tries have yet to define standards for certain pieces of information required in their business documents. Firms implementing EDI in these cases are using the new ANSI X12 basic standard.

In most cases, however, the generic ANSI X12 standard is not comprehensive enough to cover everything needed by specific industries. The EDI formats must be tweaked to include information that is commonly found in transactions in that industry.

Standards

ANSI X12 is a document standard, a standard for structuring data. For example, under X12, all purchase orders have a specific set of embedded numbers in the record that identifies the data

(continued on page 54)

(continued from page 53)
stream as a purchase order.

Specific characters, such as asterisks or slashes, denote breaks between different pieces of information. The information itself is coded in such a way that the receiver knows which data is coming next, allowing the document to be reassembled accurately. These codes also are important because the data streams can be of variable length.

In many cases, EDI standards are organized into vertical markets, such as railroad, grocery, warehouse, banking and automobile manufacturing. The companies within a specific industry that use EDI sign up to employ the same service or decide on a uniform code for that industry.

Some companies want to use multiple EDI services or at least be able to send a message to a company in a different industry. Companies that interface across industry lines face a choice of three ways to cross standards boundaries:

■ **EDI software.** There are generally two types of software: one designed for hub companies and the other designed for smaller trading partners. The more complicated software used by the hub companies allows them to send documents in a different standard than what they typically use — for example, the Transportation Data Coordinating Committee (TDCC) standard instead of ANSI X12.

The software will translate the data from the application software, such as invoicing and accounting software, directly to the other standard. Achieving this is a

complex matter and requires the skilled personnel who run large companies' EDI systems.

For smaller companies, their simpler software is usually designed to do a specific translation, such as changing an invoice into ANSI X12 to send to ABC company. When these companies want to do different translations, they must buy another software module or upgrade their current one.

■ **Value-added network.** For companies that either do not have the software capabilities to do a proper translation or don't want to purchase upgrades or new software modules, or for those that wish to deal only with one EDI standard for their documents, VANs offer translation services.

When an EDI document is sent from one company to another, it is sent into the network and, from there, placed in the recipient company's mailbox. When a document needs to be translated from one standard to another, the VAN does this before placing the message into the receiving company's mailbox.

■ **Application software.** Some application software, such as invoicing software or purchase order software, has the capability to output in different formats, such as ANSI X12 or the Warehouse Information Network Standard (WINS).

This software is developed in concert with the EDI suppliers so that internal software systems will translate documents directly into a standard format for sending via EDI. Often when dealing with smaller trading partners,

this is devised so that a document will arrive in EDI format exactly as the larger hub company designates.

These standards translations are important to companies sending EDI. If a document doesn't follow a certain format, the receiving companies will be unable to use the information.

ANSI X12 has established itself as the generic standard upon which new industry standards have been based. Recently, new standards, such as the Telecommunications Industry Format standard, have been based on the X12 standard. In addition, older standards such as TDCC are being brought under the X12 umbrella in an effort to further standardize the EDI marketplace.

Finding partners

Large companies can have thousands of trading partners. When these companies do business with one another, they create transaction documents, such as invoices, purchase orders and price quotes.

Conventional methods of keeping track of these documents, as well as fulfilling numerous requests for price information and products, can be time-consuming and leave quite a paper trail. These documents contain the type of information that is best suited to streamlining through EDI.

For an EDI program to be most effective, hub companies should have a critical mass of trading partners using EDI.

The general rule of thumb is that 20% of a hub's trading partners create 80% of the hub's transactions. The trading partners composing this 20% represent the "anchoring" firms that justify the EDI network. The remaining 80% of trading partners represent only 20% of a firm's transactions, many of which may be onetime occurrences. The biggest issue for EDI users today is getting that initial 20% signed up. To do this, hub companies have taken remarkably varied approaches.

Some hub companies have attempted to coerce small companies into EDI with tough talk such as, "No EDI, no purchase order." Other hubs have taken a more parental stance, working with EDI providers to guide smaller companies toward EDI.

The consultative approach seems to work best. As mentioned earlier, EDI network providers have developed personal computer software systems and support programs designed to make EDI easy for smaller companies. In addition, network providers have teamed up with hub companies to sponsor EDI seminars and workshops, often allowing potential trading partners to use software on a trial basis.

Bell Atlantic Corp., which recently entered the EDI market with its IntelTrade product, is targeting smaller companies. The

regional Bell holding company is looking to parlay its historical relationship with small companies into a broad-based EDI program.

All of the EDI networks included in the chart on page 52 offer large users complete turnkey EDI packages, including the hub company's basic EDI service and special training programs for planning, marketing and implementing small trading partner participation.

EDI networks are based on a mailbox architecture in which us-

Hub companies should have a critical mass of trading partners using EDI.



ers send transactions into a recipient's mailbox. EDI message recipients can download these documents from the mailbox at any time. EDI network services are more than message transport services. EDI service providers offer a range of value-added services as well. Among these are:

■ **Audit trail capabilities.** Audit trails allow a user to track transactions on the EDI network. The user can confirm that the message has been received by the addressee, recording when the message was placed in the recipient's mailbox and when it was picked up. This feature is very important for items such as time-sensitive orders.

If a transmission problem occurs, then the audit trail allows companies to discover where and when it happened so that the situation can be handled.

■ **Standards translation services.** These services handle translation of documents from one standard to another. They are handy for companies that want to trade with one another over the same network but have different internal systems based on incompatible standards.

■ **Tracking and account reports.** These reports, like network management reports for a voice or data network, allow users to track network efficiencies, account for network costs and manage the overall EDI network. The types of reports that are provided by the network companies include bill detail, delivery notification, mailbox status reports and message status reports.

■ **Call accounting.** This feature allows EDI users to share the costs of EDI service or charge EDI costs to the hub company.

■ **Dial out.** This feature allows a company to have a computer linked to the network automatically dial out and download information — either at a specific

time, such as off-peak hours, or when certain levels of data collection are reached.

■ **Interfaces to other networks.** Occasionally, the need to communicate with companies signed up on different networks arises. For example, a company has its mailbox on one network while another company is sending to that company's mailbox but is signed up on a different network.

At some point, the message must pass from one network to the other in order to be delivered. This occurs over an internetwork gateway provided by the VAN. Internetwork gateways are common among VANs, with each network providing a number of different interconnections with other network providers.

Multiple networks

Many large users buy service on multiple EDI networks from different carriers. Some of the reasons for this include:

■ **Redundancy.** EDI networks carry some of the companies' most critical information. Lost invoices mean lost profits. While EDI allows companies to operate on a more timely basis, business can grind to a halt when an EDI network goes down. By using multiple networks, companies can effectively maintain a "hot spare" to avoid downtime.

■ **Multiple uses.** The various parts of a large company often have different needs. An average purchasing department may perform most of its EDI communications with retail firms, whereas the shipping department may perform most of its transactions with rail companies. In these cases, two different networks may be required for both departments to communicate with their specific parties.

■ **Data security.** Most users are concerned about the security of their data. EDI networks are designed with passwords to keep unauthorized persons from tampering with data in the network.

In addition, with a secure EDI network, users can more easily track and find transactions and be alerted when problems arise on the network. Audit trails give EDI users the ability to keep close tabs on transactions as they make their way through the network. Most intranetwork EDI communications allow for careful tracking of transactions.

When dealing with transactions that cross network boundaries — internetwork communications — the situation is different. Although many of the EDI networks can interconnect with other networks, this interface does not allow for such critical audit trail information to be passed along with transactions across networks.

However, AT&T has positioned itself to meet these multi-network concerns through its EDI product, AT&T EDI. AT&T EDI is

(continued on page 56)

Glossary of EDI terms

■ **ANSI:** The parent organization of the X12 standard and the recognized clearinghouse for information on U.S. national standards.

■ **ANSI Accredited Standards Committee X12:** The group responsible for developing and maintaining U.S. EDI standards.

■ **Chemical Industry Data Exchange (CIDX):** The U.S. chemical industry's EDI guideline based on the X12 standards. It is also the term for the industry association for developing CIDX.

■ **Data dictionary:** A major source for EDI information. It lists all of the elements for which standards exist. The most popular data dictionary is the Joint Electronic Data Interchange (JEDI).

■ **Document:** An EDI transaction set or an EDI message.

■ **EDI for Administration, Commerce and Transport (EDIFACT):** Standards developed by Working Party 4 on the streamlining of international trade procedures for the Euro-

pean Economic Commission.

■ **Hub:** A company that is active in the implementation of EDI within an industry. Usually larger companies, they prompt trading partners to adopt the technology as well.

■ **Message Handling Service (MHS):** Represents the overall X.400 structure capabilities and message handling entities.

■ **Transportation Data Coordinating Committee (TDCC):** A key player in the creation of standards for EDI messaging and a communications structure based on transaction sets.

■ **Trading partner:** In a general EDI sense, any company sending and receiving documents via EDI.

■ **Transaction set:** A complete document or message. This can be an invoice, purchase order or other form of remittance advice.

■ **X12:** The ANSI standard for interindustry electronic interchange of business transactions.

— Mark Langner

EDITORIAL

REPRINTS

FROM

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

Network World

Highlight your editorial coverage!

Coverage of your company's news or product introductions in *Network World* means valuable exposure in the enterprise networking marketplace. Build on the positive awareness by ordering your reprints today.

Editorial reprints make great leave behinds for:

- Press
- Sales Prospects
- Company Seminars
- Trade Shows
- Distributors
- Internal Meetings

Reprints are available in various quantities* and can be customized to include your company logo, address and sales office listings.

*Produced in minimum quantities: 500 for black & white or two-color, 1,000 for four-color reprints.

For information on ordering reprints contact:

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

REPRINTS

Donna Kirkey
Reprint Department
Network World, Inc.
The Meadows
161 Worcester Road
Framingham, MA 01701-9172
Tel. 1-800-622-1108

Investors may cast wary eye

By Maureen Molloy
Staff Writer

Governments worldwide are increasingly looking to privatize their post-telegraph and telephone monopolies as a way to improve communications to services or raise money, but experts question whether there is enough available capital to sustain all of the sales.

Telecommunications monopolies are viewed by many as a safe and usually profitable investment, but some observers warn that a glut in the market will leave PTTs without takers. They say too many telecommunications authorities are coming up for sale at once and sellers are competing for limited capital against other attractive investment opportunities. What's more, some PTTs are seen as a bad risk for investors.

"What was once a seller's market has quickly changed into a buyer's market. Investors are becoming much more selective," said Jack Stockdale, chief of research at the Jack Stockdale Research Centre in West Sussex, England. The developing countries that could benefit most from privatization are the ones that will have the most trouble ones that will have the most trouble. "There isn't that kind of money around so just isn't the most advanced PTTs that can only the most advanced PTTs that can produce the quickest return on investment will capture investors' interest."

Currently, 27 countries are looking at partial or complete privatization of their telecommunications authorities (see graphic). Stockdale estimates the total investment in these privatizations would be in excess of \$145 billion.

Phone companies are becoming more selective in their investments but said new investors will provide enough capital to fund privatizations. "Phone companies don't have enough money to act as sole financiers. But many companies outside of the telecommunications field have shown strong interest in PTT investment," said "Everyone wants a part of this because once it reaches maturity, a phone company becomes a license to print money." Some nontelecommunications companies that have invested heavily in PTT pri-

REPRINTED FROM NETWORK WORLD

Going private

Year	Country	Year	Country
1990	Argentina	1992	Hungary
1990	Mexico	1992	Czechoslovakia
1991	Puerto Rico	1992	Poland
1992	Venezuela	1991	Israel
1993	Columbia	1992	Saudi Arabia
1994	Brazil	1992	Turkey
1990	Paraguay	1991	Kenya
1990	Portugal	1991	Nigeria
1991	Sweden	1992	Malaysia
1992	Ireland	1991	South Korea
1992	Netherlands	1991	South Africa
1992-1993	Denmark	1991	South Korea
1993	Belgium	1991	South Korea
1994-1995	Germany	1991	South Korea

* Domestic carrier only.
* Privatization was expected in 1991, but the current Middle East conflict probably delay sale by at least one year.
SOURCE: TELECOMMUNICATIONS RESEARCH CENTRE, WEST SUSSEX, ENGLAND

REPRINTED FROM NETWORK WORLD

FEATURE

Testing the LAN testers

By Colin Mick and Dan Nagel
Special to Network World

The latest *Network World* LanQuest Tests of local-area network protocol analyzers show that fundamental product differences will require users to scrutinize their individual net needs before buying an analyzer.

ability to monitor LAN operations, capture and display packets and decode five common LAN protocols. Each analyzer has a unique style and method of dealing with basic functions. LAN analyzers typically perform several functions, including monitoring network operations, capturing packets for playback and analysis, cable testing and broadcasting packets onto the network. Our tests focused on two primary functions of interest to users — network monitoring (utilization) and packet capture — and one secondary function: protocol analysis.

Three of the analyzers had been upgraded since our last test article, and one had changed entirely. The LANalyzer has a new version of software, Version 3.0, that offers extended features, including expanded protocol decode, which now covers all seven layers of the Open Systems Interconnection model. It also offers a set of predefined experiments covering most typical applications. Each of the experiments can be customized and saved under a different name. The *Network Analyzer*...

REPRINTED FROM NETWORK WORLD

FEATURE

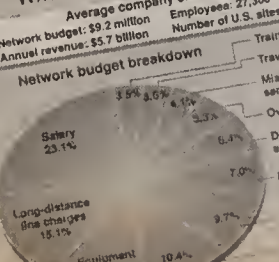
The ups and downs of communications budgets

By Salvatore Solomone
Features Writer

Deepening fears of recession and dire economic forecasts may have already made an impact on next year's telecommunications budgets, according to the 1990 *Network World* budget survey. After seeing years of steady growth, network managers expect 1991 budgets to decline by about half of one percentage point from this year's figures.

of \$1.2 billion) and about 27,300 employees in the U.S. Much of the overall reduction can be traced to expanded user cost-control programs, including internal chargeback systems, and to reallocation of communications funds. In fact, companies may actually spend more on communications next year but divide it among more departments. "I don't think organizations will be spending less [money]," says Barry Gilbert, a principal at TFS, inc., a Westford, Mass.-based consulting and research firm that has been conducting communications spending surveys and constructing industry spending models for six years. "The costs will be more diversified within the operation. There is a lot more cost control and charging back of communications costs being implemented, particularly by large corporations," Gilbert adds. About 32% of the survey respondents indicate that their companies charge back all

Where the network dollars go



SOURCE: NETWORK WORLD INC. & THE WESTFORD MASS. GRAPHIC BY SUSAN ELLIOTT

Making the Centrex choice

continued from page 40

ration, all trunks appear on all consoles. The Conveyant console levels the call load by enabling all console operators to handle all calls.

The data base software allows operators to process calls without having firsthand knowledge of Astro's personnel or a memorized list of their extension numbers.

Centrex service eliminates most of the on-site hardware.

▲▲▲

It also allows extension numbers to be reassigned or personnel to be moved to different departments without confusion. Of course, this requires strict data base management. At Astro, the data base is typically updated every Wednesday evening.

Console limits

Astro management felt confident that Conveyant's Centrex console would provide some relief to overworked console operators and would go a long way toward eliminating the ring/no answer problem. However, the Centrex Console does have limitations.

First, although each LCE can handle four consoles, these consoles handle the same 16 trunks. To expand the number of trunks the attendants are able to handle via the consoles, an LCE must be added. The maximum number of LCEs that can be used is two.

In addition, the Conveyant console is limited to 120 busy indicators. These indicators are provided in a separate window on the attendant's screen. Fortunately, Conveyant provides an option to run what AT&T calls Simplified Message Desk Interface (SMDI), which runs on the 1AESS.

SMDI is a data link that runs between Conveyant's LCE and the central office switch. It provides status information from Centrex about calls received at the console. Examples of typical status are call forward/busy and call forward/no answer. The SMDI option allows the system manager to configure as many stations as desired and still provide line status to the operator.

More hardware

One of the goals in the design of Astro's Centrex system was the elimination of any on-site key equipment. Centrex service eliminates most of the on-site hardware required by a business. But

the emphasis here is on *most*.

At present, the maximum number of lines that can be handled on a single telephone without the use of key equipment is five. In other words, if the user wanted to have phones with more than five extensions, it would need to install key equipment.

After careful consideration, it was decided that Northern Telecom, Inc.'s Norstar key equipment would be implemented in the service department, where secretaries need to handle more than five lines per set.

Astro purchased the Northern Telecom equipment and a number of five-line nonkey telephone sets from Pacific Telesis Group. In conjunction with the purchase of this equipment, it signed an agreement with Pacific Bell that made the Bell operating company Astro's single point of contact for all maintenance calls on any equipment purchased from Pacific Telesis.

This agreement was extremely valuable to Astro for a number of reasons. First, it would allow the coordination of all maintenance issues with one vendor. Second, it would free in-house personnel from involvement in problem determination.

The selection of Centrex, coupled with the hardware selected and the single point of contact agreement, gave Astro a telephone system that:

- solved the problems being experienced.
- was cost-effective.
- provided a system that needed only a minimum of maintenance by in-house personnel.
- provided the flexibility for future growth.

The remaining roadblocks

The most serious of the problems that remained involved the equipment that was purchased through Pacific Telesis. Installation and maintenance of the

A major problem was erroneous feature configuration.

▲▲▲

equipment were farmed out to a third party, which, to put it mildly, did not live up to Astro's expectations.

The lesson here is that before purchasing equipment, a company needs to ask:

- who is actually providing the equipment.
- who will perform the installation and maintenance.
- what recourse does the company have in the case of dissatisfaction.

It should be noted here that the signing of the contract that

provided single point of contact service from Pacific Bell was the saving grace in dealing with the above issue. Pacific Bell handled all problems and performed admirably.

Companies should also be aware that although Centrex is a global product offering, it is implemented on a number of different switches.

Feature availability and feature implementation can differ from switch to switch and from one software release to the next. It may be helpful to ask the Centrex representative to provide a diagram of how a particular feature will work on the switch in question.

Another major problem encountered by Astro is a fairly common one — erroneous configuration of features on individual lines. For example, some phones that needed call waiting and call forwarding didn't receive them.

The cause of this problem was largely miscommunication between users and the system designer.

Prior to the Centrex implementation, department managers were asked which phone features they were currently using and which were needed. In some instances, the managers had an erroneous perception about how phones were being used in their departments.

To avoid such problems:

- Sit down with as many users as possible to find out how they use the telephone.
- Before making the final design, run it past as many users as possible to determine whether it actually provides the functionality they need.
- Use practical examples that describe desired call flows in a real sense. As much as possible, avoid using highly technical terminology in explanations.

For example, ask, "If you are on the phone and I want to call you, what happens to my call? Do I get a busy signal, or will the call go somewhere else?" Sometimes the user won't know the answer, in which case, try it out. Other times, the user may have an erroneous idea of what happens, in which case, be ready to make changes at implementation time.

An enormous problem that always needs to be addressed in any type of system implementation is end-user resistance to change. When handling user complaints, it is imperative to stress the pluses that the system brings to the user — and to the company.

Lastly, one needs to make a presumption. That presumption is that the project is bigger than one imagines it to be. It is not necessary to take the "anything that can go wrong will go wrong" attitude.

However, even though complex projects can be planned in a matter of minutes, the actual implementation is inevitably much more complicated. ▮

Doing business electronically

continued from page 54

based on an X.400 network architecture that allows for inter-network communications. X.400 allows tracking information to travel with the transaction across network boundaries.

Choosing an EDI supplier

There aren't a great number of delimiting factors between the different EDI networks.

By their nature, most EDI services must be generic to a degree. Most EDI network providers can handle the public standards such as X12, WINS, TDCC, Automotive Industry Action Group, Voluntary Inter-industry Communication Standards, Chemical Industry Data eXchange and EDI for Administration, Commerce and Transport (EDIFACT) (see "Glossary of EDI terms," page 54).

The primary differences between EDI networks mainly concern the types of businesses for which each network was de-

Price is one of the least important decision factors in picking an EDI net.

▲▲▲

signed. For example, RAILINC Corp.'s RAILINC Network Service grew out of the specific needs of the railroad industry and still caters to companies seeking to interface with that industry.

While this industry-specific nature might seem to make it easy to choose an EDI supplier, the decision is complicated by the multiple network use mentioned earlier. A company may receive multiple demands for external EDI connections.

For example, a forklift parts supplier might be pressured by an automobile company to join a certain EDI network. However, this network may not fulfill the EDI needs of this company's other clients in the grocery, railroad and warehouse industries.

Before embarking on an EDI program, companies should make sure that the chosen EDI network vendor will allow them to interface with the largest number of clients now and especially in the future as more companies begin using EDI.

Pricing

Price is generally one of the least important decision factors in picking an EDI network. Choosing the right system and right network hold a higher priority.

But pricing is another complicated issue. In most cases, service pricing must be compared on a case-by-case basis to be of any value to the potential user.

One of the more interesting and popular trends in EDI pricing is split billing. Larger hub firms typically get much more attractive pricing for EDI because of their larger volume. Split billing allows a user to take advantage of a hub company's discount pricing by sharing the cost of sending an EDI message with that firm.

The whole transaction is billed at the hub customer's rate, but the actual charges are split between the sending and receiving firms' bills. While this may seem like a subsidy to the smaller firm, the larger firm is actually getting the smaller firm to assume a portion of the cost, which is often the intent.

An overall drawback to EDI networks is that their pricing is too complicated. After an internal marketing study, one EDI product manager noted that he tracked more than 100 different items included on customer bills for various EDI services. However, some network providers are trying to simplify their method of pricing by reducing the number of items for which they charge.

The future of EDI

Despite the intricacies and quirks of EDI, usage is increasing and the EDI market environment is going to improve. As more companies include EDI in their operations, the cost of implementing it will continue to fall, making EDI more attractive to other users.

In addition, companies that never thought to use EDI with certain suppliers will discover that they share an EDI network, prompting a new EDI business relationship.

EDI transport based on the X.400 data protocol will enable data tracking information to be sent with EDI messages, allowing internetwork communications and improving the audibility of messages sent through and between networks.

X.400 will give the user more end-to-end control over messages sent on the network. X.400 will generally be utilized by larger users that can take advantage of these added features. Smaller users will likely continue sending messages as they do today, with network providers supplying the link between the two systems.

In the end, standards will be the critical EDI issue. The ANSI X12 foundation has brought the first major piece of standardization to the EDI industry.

Unfortunately, X12 is not comprehensive enough to answer all of the questions EDI usage prompts. These questions will still be addressed on an industry-specific basis for some time, at least until another layer of the standards process is completed. ▮

I WANT TO GET OUR DATA NETWORK UP AND FLYING, TOO.



NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

PHONE _____

☐ Please send me more information on Northern Telecom's extremely reliable data networking systems.

☐ Please have a Northern Telecom representative call.

NW



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT 1375 DURHAM, NC

POSTAGE WILL BE PAID BY ADDRESSEE



Northern Telecom Inc.
Data Networks Division
P.O. Box 13010
2525 Meridian Parkway Suite 400
Research Triangle Park, NC 27709
Attention: P. Duncan

Router firms to support SDLC traffic

continued from page 1

Pass-Through feature for its routers that will enable them to support SDLC and the High-Level Data Link Control protocol. HDLC will give the routers support for X.25 devices such as switches and packet assembler/disassemblers.

Users today can attach devices such as IBM 3174 cluster controllers to a token-ring LAN, then attach the LAN to a bridge/router and support SNA traffic in that fashion. But that strategy has some drawbacks. For example, it requires use of IBM's source routing algorithm, which can create an inordinate amount of overhead, especially in large mesh networks.

In addition, the configuration requires that controllers be attached to token-ring LANs, and many aren't.

The enhancements to cisco Systems and Wellfleet bridge/routers will let users attach 3174s, front-end processors or other synchronous communications devices directly to the bridge/router.

"And it's backward-compatible with the

SNA environment. You're not touching the cluster controllers or front-end processors at all," said Nick Lippis, principal at Northeast Consulting Resources, Inc. in Boston.

Among the cisco Systems users who are awaiting the enhanced AGS router is Dan McCormick, manager of networking and integration at Contel Federal Systems in Chantilly, Va.

McCormick said cisco Systems told him a new SDLC tunneling feature will be available for the AGS in the first quarter of 1991. With the feature, SDLC data frames will be encapsulated for transmission across the backbone.

That will be a welcome addition for Contel Federal Systems, which currently uses IBM's Network Control Program Packet-Switching Interface (NPSI) soft-

ware to encapsulate SDLC in X.25 and ship it through its cisco Systems routers. The enhancement will obviate the need for NPSI, which should improve performance, McCormick said.

Philip Hewitt, engineering manager at Boeing Computer Support Services in Huntsville, Ala., said cisco Systems has also told him about its plans to support SDLC.

Hewitt said the feature will be used to consolidate a separate SNA net onto a multiprotocol backbone based on cisco Systems routers that Boeing runs for the National Aeronautics and Space Administration (see "Multiprotocol backbone is giant step for NASA's LANs," page 1).

"It'll mean the ability to combine another network and provide an additional

level of savings because of efficient utilization of bandwidth," Hewitt said. "We would treat [SDLC] as another protocol."

Karen Barton, director of product marketing at Wellfleet, said her company will offer the Transparent Synchronous Pass-Through feature in February as a software upgrade free of charge to users under software subscription.

Users will define dedicated connections between any two SNA end points on the network, which means the bridge/router does not support any SNA addressing, Barton said.

But when the bridge/routers are installed in a mesh configuration, they are still able to dynamically choose the best path and recover from line or equipment failures. ■

DEC to offer Telnet on DECservers

continued from page 6

Telnet enables any vendor's terminal to establish a session with another vendor's host that supports the Telnet protocol. Telnet terminal sessions are transmitted over networks in TCP/IP packets. LAT, by contrast, is designed to support terminal sessions between DEC terminals and VAXes or other hosts supporting LAT.

A DECserver 300 software upgrade — including the Telnet support — will be included by mid-1991 free of charge to customers currently covered by maintenance contracts or warranties.

Telnet support will also be built into new DECserver 300s.

DEC's DECserver 200 and DECserver 550 will not be upgraded to support Telnet since both products would have to undergo hardware upgrades, Cooper said.

With the announcement, DEC is providing the same capabilities on its DECserver 300 that firms such as Xyplex, Inc. and Datability Software Systems, Inc. have provided on their DEC terminal servers for some time, analysts said.

"In one sense, this can be viewed as a competitive response by DEC," said Howard Niden, director of Price Waterhouse's Great Lakes VAX consulting practice in Chicago. "But in another, it reflects Digital's aggressive stance to get into the open systems world."

Others see DEC's support for Telnet as an interim step to provide links to other vendors' systems until the OSI-based DECnet Phase V can be delivered.

Without such support, DEC would lose ground to vendors pitching open systems wares while it struggles to roll out DECnet Phase V, which was supposed to be released this year but has been delayed possibly for months ("DEC details 18-month Phase V plan," *NW*, Sept. 17).

"This is one of the things DEC had to do because DECnet OSI has been delayed for so [long]," said Nili Young, vice-president of mid-range systems strategies at the META Group, a consulting firm in Westport, Conn.

Even though it added Telnet to the DECserver 300, DEC will continue to support LAT, Cooper said. ■

A DATA SYSTEM SO RELIABLE THEY PUT ALL THEIR PASSENGERS ON IT.

It's a Northern Telecom DPN-100 packet switch. One of a fleet that links the American Airlines SABRE® reservation network—the world's largest private real-time computer network and the biggest travel information database.

American knew about our dependability before they started using our packet switching. For years American has used our PBXs and relied on centrex services from Northern Telecom systems. Even so, American was impressed by our 99.995% system

availability—a level our data systems actually exceed in every kind of network—from the smallest to the world's largest.

And as American grows it can expand easily. Because our systems are X.25 and SNA compatible, and our modular design takes on increased traffic without new equipment.

So if your company needs a reliable global data network, call 1-800-NORTHERN. We'll get one up and flying for you.

nt northern telecom



NORTHERN TELECOM

TECHNOLOGY THE WORLD CALLS ON

© 1990 Northern Telecom. DPN is a trademark of Northern Telecom. DND001013

IEEE spec to bolster services

continued from page 6

expanded to switch voice and video traffic in addition to data.

"The standard will be a great help for vendors because it gives them a solid document to build equipment to. And, hopefully, equipment from different vendors will interoperate," said Louis Hatton, data communications manager for Pacific Gas & Electric Co. (PG&E), a San Francisco

utility company.

PG&E, Stanford University, Apple Computer, Inc., HP and Tandem Computers, Inc. will participate in a Pacific Bell SMDS field trial scheduled to begin in a few weeks.

"We see SMDS primarily as a way of securing higher bandwidth connections at rates below those of dedicated private lines," Hatton said. "Although SMDS pricing has not yet been formulated, we would expect substantial savings from such a replacement." ■

Network World Advertising Sales Offices

BOSTON

Donna Pomponi, District Manager
161 Worcester Road
Framingham, MA 01701
(508) 875-6400

NEW YORK

Paul Bonington, District Manager
365 W. Passaic St.
Rochelle Park, N.J. 07662
(201) 587-0090

NEW JERSEY/PHILADELPHIA/D.C.

Joan Daly, Eastern Regional Manager
365 W. Passaic St.
Rochelle Park, N.J. 07662
(201) 587-0090

CHICAGO

Dan Gentile
10400 West Higgins Rd., Suite 300
Rosemont, Ill. 60018
(708) 297-8855

SAN FRANCISCO

Chris Curry, Western Regional Manager
Sandra Kupiec, District Manager
2083 Landings Drive
Mountain View, Calif. 94043
(415) 691-0510

ATLANTA

Bill Perry, District Manager
1400 Lake Hearn Dr., Suite 330
Atlanta, Ga 30319
(404) 394-7509

LOS ANGELES

Dana McCarron, District Manager
18008 Sky Park Cir., Suite 145
Irvine, Calif. 92714
(714) 250-3006

RESPONSE CARD DECKS

ACTION CENTER

PRODUCT CLASSIFIED ADVERTISING RESOURCE DIRECTORY

Joan Bayon Pinsky, Sales Director/
Product Classified
Clare O'Brien, Account Executive
Mountain and Pacific Time Zones
161 Worcester Road
Framingham, Mass. 01701
(508) 875-6400

RECRUITMENT ADVERTISING

Barbara Hill
161 Worcester Road
Framingham, Mass. 01701-9172
(508) 875-6400

ADVERTISING OPERATIONS

Pam Valentinas - Mgr./Mktg. & Sales Ops.
Karen Wallace - National Account Supervisor
Linda Miller - W. Region Account Coord.
Barbara Hill - Classified Account Supervisor
(508) 875-6400

Network World is a publication of IDG, the world's largest publisher of computer-related information. IDG publishes over 130 computer publications in more than 40 countries. Nineteen million people read one or more IDG publications each month. IDG contributes to the IDG News Service offering the latest on domestic and international computer news. IDG publications include: ARGENTINA'S *Computerworld Argentina*; ASIA'S *Astian Computerworld*; AUSTRALIA'S *Computerworld Australia*, *PC World*, *Macworld*; AUSTRIA'S *Computerwelt Oesterreich*; BRAZIL'S *DataNews*, *PC Mundo*; CANADA'S *Computer Data*; CHILE'S *Informatica*, *Computacion Personal*; COLUMBIA'S *Computerworld Columbia*; DENMARK'S *Computerworld Danmark*, *PC World CAD/CAM World*, *Macworld*, *Unix World*, *FINLAND'S Mikro PC*, *Tietotikko*; FRANCE'S *Le Monde Informatique*, *Distributique*, *InfoPC*, *Telecoms International*; HUNGARY'S *Computerworld SZT*, *Mikrovilag*; INDIA'S *Computers & Communications*; ISRAEL'S *People & Computers*; ITALY'S *Computerworld Italia*, *PC World Italia*; JAPAN'S *Computerworld Japan*, *Infoworld*, *Publisb*; KOREA'S *Hi-Tech Information/Computerworld*; MEXICO'S *Computerworld Mexico*, *PC Journal*; THE NETHERLANDS' *Computerworld Netherlands*, *PC World*, *Amiga World*; NEW ZEALAND'S *Computerworld New Zealand*; PC World New Zealand; NIGERIA'S *PC World Africa*; NORWAY'S *Computerworld Norge*, *PC World Norge CAD/CAM*, *Macworld Norge*; PEOPLE'S REPUBLIC OF CHINA'S *China Computerworld*, *China Computerworld Monthly*; POLAND'S *Computers*; SPAIN'S *CIM World*, *Computerworld Espana*, *PC World*, *Amiga World*, *Comunicaciones World*; SWEDEN'S *Computer Sweden*, *PC/Nybetberna*, *MikroDatorn*, *Macworld*, *PC World*; SWITZERLAND'S *Computerworld Schweiz*; TAIWAN'S *Computerworld Taiwan*, *PC World*; UNITED KINGDOM'S *Graduate Computerworld*, *ICL Today*, *LOTUS UK*, *Macworld UK*, *PC Business World*, *UNITED STATES Amiga World*, *CIO*, *Computerworld*, *Digital News*, *Federal Computer Week*, *GamePro*, *InCider*, *Infoworld*, *International Custom Publishing*, *Macworld*, *Network World*, *PC Games*, *PC Resource*, *PC World*, *Portable Computer*, *Publisb*, *Run*, *Sun Tech Journal*; USSR'S *PC World USSR*, *Manager*, *PC Express*, *Network*; VENEZUELA'S *Computerworld Venezuela*, *Microworld*, *Computerworld*; WEST GERMANY'S *Computerwoche*, *Information Management*, *PC Welt*, *PC Woche*, *Amiga Welt*, *Macwelt*.

Network World, Inc.

An IDG Company

Network World Headquarters:
161 Worcester Road
Framingham, Mass. 01701
Phone: (508) 875-6400
FAX: (508) 879-3167

Gary Beach - President
Mary Fanning - Dir. of Financial Operations
Nanci Farquharson - Adm. Assistant
(508) 875-6400

Don F. Mahlmeister
National Sales Manager

MARKETING

Evilee Thibeault - Director of Marketing
Carol A. Leonard - Marketing Comm. Specialist
(508) 875-6400

RESEARCH

Ann MacKay - Research Manager
(508) 875-6400

CIRCULATION

Richard Priante - Director of Circulation
Renee Visconti - Fulfillment Supervisor
Jim Pernock - Customer Service Rep.
(508) 875-6400

PRODUCTION

Ann Finn - Production Director
Cheryl Rothman - Production Assistant
Anne Rosenkranz - Imaging Coordinator
Patricia O'Rourke - Quality Assurance Coord.
(508) 875-6400

REPRINTS

Donna Kirkey - Reprint Coordinator
(508) 875-6400

LIST RENTAL SERVICES

Kevin Normandeau - List Rental Sales
P.O. Box 9151
Framingham, MA 01701-9151
(508) 879-0700

INFORMATION SERVICES

Jeff Pennett - Director of Info. Services
Jack McDonough - Mgr. of Info. Services
(508) 875-6400

DISTRIBUTION

Bob Wescott - Distribution Manager
(508) 879-0700

IDG

Patrick J. McGovern
Board Chairman

Axel Leblois
Vice Chairman

Walter Boyd
President

William R. Murphy
Vice-President Finance

MCI unveils X.400-based EDI

continued from page 1

from a single account on the same network, which provides for simplified billing, MCI said.

MCI EDI 400 will compete against similar services provided by AT&T, BT Tymnet, Inc., GE Information Services, IBM and In-fonet Services Corp.

However, unlike MCI EDI 400, rival services don't support the integration of EDI files with text messages or graphics, MCI said.

MCI EDI 400, which supports the CCITT X.400 messaging standard, allows EDI documents to be transmitted to any supplier or customer connected to MCI Mail, even if they don't support X.400.

MCI also announced an agreement with Supply Tech, Inc., an Ann Arbor, Mich., EDI software provider, under which Supply Tech will enhance its STX12 personal computer-based software for integration with MCI Mail. The software will translate proprietary E-mail messages into X.400 format so users can establish a connection to MCI EDI 400 and send and receive EDI files to suppliers and customers.

MCI said the new service supports all EDI standards, including both proprietary and public formats such as ANSI X12, EDI for Administration, Commerce and Transport (EDIFACT), Transportation Data Coordinating Committee, Uniform Communications Standard and Warehouse Information Network Standards. MCI EDI 400 will also translate between dissimilar formats, MCI said.

Support for X.400 provides users with audit trail capabilities by tracking the location of an EDI file traveling across the public E-mail network.

MCI can track the location of an EDI message on its network and inform the sender when it has been handed off to the recipient's private net.

The X.400 protocol eliminates user concerns about dealing with multiple trading partners with different communications protocols, line speeds, hardware and software, MCI said.

EDI files are delivered on a store-and-forward basis to accommodate time zone differences.

Mark Payne, EDI manager of Texas Instruments, Inc.'s Information Technology Group and a user of MCI's value-added network (VAN), said the X.400 service is valuable for users because it suits their immediate and future EDI needs.

"The announcement shows MCI's commitment to EDI and X.400 on a long-term, worldwide basis and will help our small trading partners implement EDI by offering a turnkey solution," Payne said.

The STX12 software, for instance, will give small trading partners the ability to connect to X.400 without having in-house expertise, he added.

"For us, the X.400 feature is a tremendous plus because it will allow us to send purchase orders and graphics together in a single gateway account."

A fully integrated EDI order, for example, could include an ANSI X12 purchase order, an E-mail letter and a computer-aided design and manufacturing binary image all in one envelope, Payne said.

"Users looking at EDI as a strategic business tool will want a VAN with X.400 and worldwide capability, both of which MCI now provides," he added.

TI last year became one of the first major users to endorse X.400 as a transmission medium for EDI, representing the company's first step in its long-term strategy to standardize on X.400 for all external communications. TI began beta-testing X.400 transmission of EDI documents earlier this year ("TI embraces X.400 as medium for EDI," *NW*, Nov. 27, 1989).

The MCI EDI 400 service and the STX12 software is expected to be available early next year and will be marketed by both Supply Tech and MCI.

Customers will be charged for EDI documents sent via MCI EDI 400 at the same message rates charged for MCI Mail. MCI and Supply Tech have not set pricing on the STX12 software. ■

Vendors drive to multiprocessing

continued from page 7

tor for the gas company.

Those seven servers will be used to support business applications such as a sales recommendation system, Thomison said. "The SMP operating system is going to allow us to put business applications on the network that we were not able to before for performance reasons."

Although VINES SMP currently runs only on the SystemPro, Banyan plans to port it to other hardware platforms but declined to reveal specific platforms or time frames. Thomison said, however, that the initial release represents the bulk of the development work.

Novell remains mum

Novell, Inc., the leading network operating system vendor, has demonstrated asymmetric multiprocessing capabilities with NetWare in the past, but it has not yet made them available and would not say when it will.

Novell decided to offer asymmetric multiprocessing due to its concerns that symmetric multiprocessing could introduce overhead, according to John Edwards, product line manager for NetWare 386.

"With the synchronization and timing that needs to go on, it's not necessarily clear that symmetric multiprocessing is the thing to do," Edwards said. "NetWare is already very efficient in the way it handles [disk] reads and writes, and we want to make sure nothing gets in the way of that."

When Novell does introduce multiprocessing NetWare, it will also publish its Multiprocessing Specification to enable hardware vendors to write drivers that will activate the multiprocessing capabilities.

Although Novell has seen mostly casual interest in multiprocessing support from its users, Edwards said they want assurance that the company is committed to offering multiprocessing.

3Com Corp., a key LAN Manager OEM, is also reporting minimal interest among its users for multiprocessing capabilities. "We detect no ground swell of user demand for multiprocessing servers," said Gordon Smith, product line manager for 3Servers and 3Stations at 3Com.

In fact, the company designed its current 3Server, based on Intel Corp. 80386 and 80486 microprocessors, to be scalable and capable of supporting additional processors but then found a lack of demand for that kind of power.

"We determined that with the present operating systems, there just wasn't going to be the necessary bang for the buck to warrant anyone buying this type of product, so for the time being, we have put it on the back burner." ■

IBM moves unit overseas

continued from page 6

IBM needs stronger contact with users there.

"Having our headquarters here, with a more direct interaction with the countries as well as the customers, will strengthen our ability to market products in Europe," Hancock said.

Some analysts disagreed. "It doesn't make sense. Maybe there was European pressure to move executives there," said Atul Kapoor, vice-president of the consultancy Kaptronix, Inc. in Haworth, N.J.

Frank Dzubeck, president of

Communications Network Architects, Inc., a consultancy in Washington, D.C., said influence on standards work was a big concern for IBM. "It puts them in commuting distance to Geneva, where the standards bodies are," Dzubeck said.

Raanan Barzel, an internal consultant with Banque Nationale de Paris, said the move is a sign that IBM is serious about OSI. "IBM has already been active in OSI in Europe, but maybe [the move] is making the statement clearer as to the commitment needed," said Barzel, who is also secretary of OSITOP, a user-dominated organization chartered to promote OSI. ■

NASA's LANs take giant step

continued from page 1
for connectivity among sites.

The Space Station Freedom Program Office, which is responsible for the programming, administration and engineering work involved with building the space station, particularly needed to link a number of NASA facilities, said Philip Hewitt, engineering manager for Boeing Computer Support Services.

Among the protocols used on LANs at NASA centers are the Transmission Control Protocol/Internet Protocol, Digital Equipment Corp. DECnet Phase IV, Apple Computer, Inc. AppleTalk, Novell, Inc. Internetwork Packet Exchange (IPX) and Xerox Corp. Xerox Network Systems.

cisco Systems AGS routers, one of which acts as the core router and handles only routing functions, checking packet addresses and finding the appropriate network path for them.

Another AGS, dubbed an isolation router, supports links to smaller MGS routers attached to remote LANs.

That router maintains lists that detail which users are allowed to access the net and acts as a backup to the core router. While separating the core and isolation router functions can be expensive, it provides about a 25% increase in performance, according to Hewitt.

The core and isolation routers are linked via a Cabletron Sys-

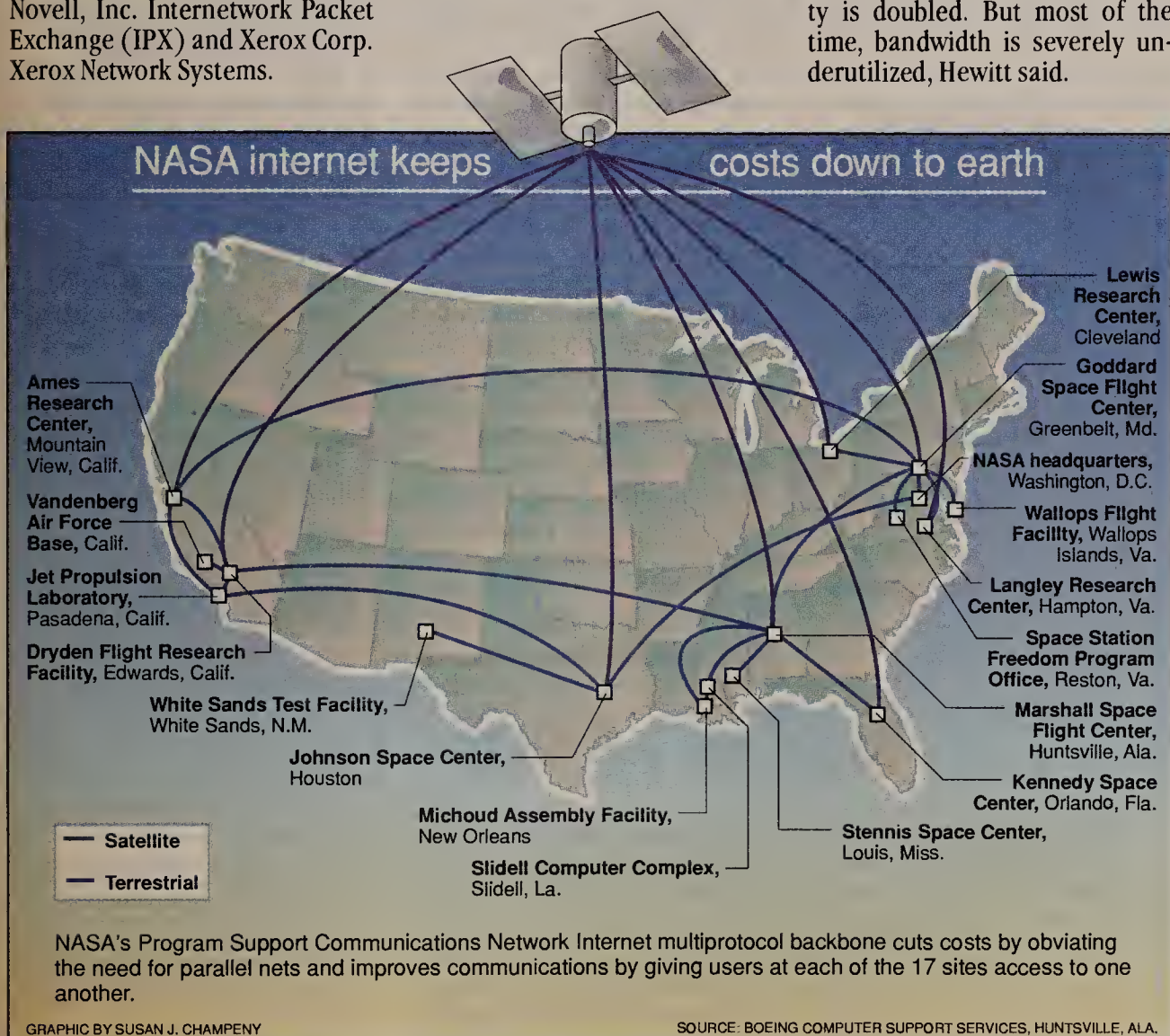
benefits PSCNI provides.

Access control is one of those benefits, and it was missing from the TCP/IP-based NASA Science Internet, which was affected by the virus that infected the Internet in 1988.

The cisco Systems routers provide an extra level of access control beyond what is provided at the workstation or host level in that users can, for example, specify that a given end system can access only specified hosts.

PSCNI also cuts costs for NASA by offering better bandwidth utilization and economies of scale.

As in point-to-point configurations, there are times on the PSCNI when there will not be enough bandwidth even if capacity is doubled. But most of the time, bandwidth is severely underutilized, Hewitt said.



Prior to PSCNI, the only vehicle for interconnecting LANs was the NASA Science Internet, which only supported TCP/IP and did not provide advanced access security features.

To link LANs based on any of the other protocols required point-to-point links between every two sites that needed to communicate.

After evaluating NASA's requirements, Boeing Computer Support Services opted to install multiprotocol routers to create a nationwide internetwork for LAN traffic.

In its early stages, the network linked six locations using 56K bit/sec lines. It has since been expanded to all 17 NASA sites, and most of the network links are T-1 lines, with some fractional T-1, Hewitt said.

Each of the 17 NASA sites has what the company calls a gateway, which includes a rack full of equipment used to link LANs at that site to PSCNI.

The equipment includes two

tems, Inc. Ethernet that supports a Compaq Computer Corp. 386/20 personal computer running Network General Corp.'s Sniffer protocol analyzer.

Ethernet ports on the isolation router are used to connect LANs located close to the gateway. A serial link connects the isolation router to remote MGS routers.

Boeing Computer Support Services will soon be upgrading the AGS routers to cisco Systems' AGS+, which has a 530M bit/sec bus. "The AGS+ will be fast enough to handle anything we can throw at it for the foreseeable future," Hewitt said.

One thing the future holds is DS3, to which the large PSCNI backbone is migrating. "Backbone speeds on PSCNI are probably going to take some quantum leaps," NASA's Scott said.

"We see our requirements as such that we will certainly use fractional DS3 if not some full DS3 links," Hewitt agreed. That growth is expected to come as more NASA users realize the

That gives each user the potential to access a much greater amount of bandwidth — up to T-1 — as opposed to the typical 19.2K or 56K bit/sec maximum in point-to-point configurations.

The PSCNI promises to evolve along with user requirements. For example, to comply with the Government Open Systems Interconnection Profile, the Space Station Freedom Program Office in Reston, Va., wants to use the OSI connectionless internetwork protocol as opposed to the connection-oriented protocol provided over the NASA X.25 net.

Cisco Systems has pledged to support the OSI connectionless protocol on its router, and Hewitt said the protocol will become the sixth supported on PSCNI.

"Ultimately, all the other protocols will go away and there will just be OSI, but that's five to 10 years down the road," he said. "So we have to provide the kind of support that is currently required as well as look to the future." □

Nynex agrees to collocate gear

continued from page 2

equipment. Nynex will charge the rival carriers a fee for the cost of floor space and electricity.

Alternative carriers currently provide local dedicated lines and private-line access services, and are restricted to serving customers in buildings accessing their networks.

The agreement will enable rival carriers to broaden their customer base but will not allow them to provide new services. But it sets the stage for alternative carriers to offer switched access services eventually.

Metropolitan Fiber Systems, Inc. (MFS) based in Oakbrook, Ill., and Teleport Communications Group of New York have petitioned regulators for permission to provide switched access services. Locating their equipment in the central office gives these carriers the necessary technological platform to concentrate and switch traffic from various users throughout a city onto their own network.

But the carriers would also need the regional Bell holding companies to modify their tariffs and get regulatory approval from state regulators to provide switched access services.

Alternative carriers said the agreement sets an important precedent in their efforts to win similar collocation agreements in other states. MFS and Teleport have been pressing state regulators for collocation arrangements.

"It's the beginning of the beginning of the end of the local bottleneck," said Robert Atkinson, general counsel for Teleport. He predicted that alternative carriers will win similar

collocation agreements in other states and eventually the right to provide switched services.

Marie Brockhurst, MFS' director of strategic marketing, agreed that the Nynex deal bodes well for the future. "The main reason [the agreement] is so important as a precedent is that it squarely addresses many of the concerns brought up in our petition with the FCC for switched access," Brockhurst said.

The collocation agreement signals a major shift in Nynex's treatment of rival local carriers. Nynex and other RBHCs have fought collocation agreements, complaining that alternative carriers — who generally serve only business districts — are cream-skimming the most profitable customers.

Nynex has been negotiating with Teleport for more than four years and with other alternative carriers for about two years on agreements in New York alone. In May 1989, the New York Public Service Commission stepped in and ordered Nynex to work out interconnection agreements. The Massachusetts Public Utility Commission has also pressured Nynex.

It has taken Nynex the last 18 months to hammer out the details of an acceptable agreement for physical collocation. Nynex aborted an earlier attempt to give rival carriers connections to the network from a remote location, known as virtual collocation.

Nynex officials acknowledged last week that pressure from state regulators both in New York and Massachusetts prompted the agreement last week. But they also conceded that rival carriers will improve the market by adding to the disaster recovery and emergency backup choices available to customers. □

EDI users tell VAN reps

continued from page 7

technology, VANs must simplify the process of implementing EDI technology. They could provide for seamless interconnection of VANs — giving users multiple options — and they could offer the translation software needed to access the VAN.

R.T. Crowley, chairman of the EDIA User Action Committee, and president of C.W. Consultants, said many EDI users believe translation software should be delivered free as part of the VAN's customer service, not as an additional requirement the user must purchase separately. "Asking the user to pay for software to access the network is like having the supermarket charge the shopper to park in its lot," he said.

Many users also balked at VAN pricing strategies, saying the multitiered rate structure used by most vendors makes it difficult to compare service costs.

"Users need a Ph.D. from MIT

to figure out how much a VAN is costing them," said Robert Lytle, an independent EDI consultant. He said vendors have different types of bills and widely varying auxiliary charges for features such as installation, session, storage and connect services.

Mark Payne, EDI manager of Texas Instruments, Inc.'s Information Technology Group, concurred. "Figuring out the cost for network services is the hardest part of EDI to understand," he said. "I'm convinced VANs do this on purpose as a way to disguise true costs."

Users also complained of inadequate EDI message-tracking capabilities. Bruce Young, EDI coordinator for Fritz Companies, Inc., an import/export transportation company in San Francisco, said he wants the ability to track his data at any point during its transmission.

"I have no idea what's happened to a document once it leaves our GE network," Young said. □

AT&T chases NCR as mate

continued from page 1

eral-purpose computer company like IBM or DEC," an AT&T spokeswoman said. "Businesses are moving more toward transaction processing-oriented applications that require both computers and networks. That is the market we want to go after with NCR."

AT&T, which had 1989 revenue of \$36.11 billion, is about six times as big as NCR, which had revenue of \$5.96 billion last year.

"AT&T and NCR make a good fit in many ways," said Michael Howard, president of the Infonetics Research Institute, Inc. in San Jose, Calif. "They could do well in leveraging each other's customer base to sell their traditional offerings — in NCR's case, computers, and in AT&T's case, network services."

Kevin O'Neill, vice-president of networking research and consulting at Business Research Group, a market research firm in Newton, Mass., agreed.

"It strikes me as a sensible move for AT&T now that the boundaries between the public network and customer premises are blurring," he said.

Other observers weren't so upbeat. Critics, led by NCR's Exley, pointed out that other mergers and acquisitions in the computer industry, such as the combination of Burroughs Corp. and Sperry Corp. to form Unisys Corp., have proven problematic.

They also cautioned that AT&T could delay the execution of NCR's much-acclaimed shift into the open systems market.

What will stay

NCR this year unveiled a grand plan to replace its various product families with the System 3000 line, seven classes of computers ranging from laptops to super-servers with massive parallel architectures that will rival the power of mainframes.

All of the products will be based on Intel Corp.'s 80486 and 80386 microprocessors and support standard operating system software such as AT&T's Unix System V.4, OS/2 and DOS.

"I can see why NCR would do everything it could to keep AT&T from taking it over," said Chuck Barney, director of research at WorkGroup Technologies, Inc. in Durham, N.H. "NCR has completely reorganized its strategy by committing to a new platform that lays the foundation for its success over the next three to five years. Now AT&T wants to come in like a school yard bully and take away NCR's nice new toy."

Whereas NCR's System 3000 line promises consistency, the collection of machines in AT&T's portfolio is something of a hodgepodge, said John Dunkle, vice-president at WorkGroup Technologies.

For the desktop, AT&T sells 80286-, 80386- and 80486-

based personal computers, some of which are manufactured by Intel. AT&T manufactures its own line of Unix-based 3B2 minicomputers and sells the System 7000 Reduced Instruction Set Computer-based servers made by Pyramid Technology Corp.

Moving up the line, AT&T offers fault-tolerant StarServer FT minicomputers made by Tandem Computers, Inc.

"Now AT&T wants to come in like a school yard bully and take away NCR's nice new toy."

▲▲▲

"AT&T's direction is toward open systems, but its product line is muddled," Dunkle said. "It's obvious that some of its products overlap with NCR's, and it is AT&T's products that will be phased out."

There is some harmony between the companies' local-area network products and strategies. AT&T's LAN offerings include StarGroup LAN Manager Server, a Unix-based network operating system. AT&T also offers inter-networking products such as

StarWAN Routers for Ethernet and Fiber Distributed Data Interface nets, which are offered under an OEM agreement with Cisco Systems, Inc., and StarWAN Bridges, which are made by Hewlett-Packard Co.

NCR already has an OEM agreement with AT&T for its Unix-based LAN operating system and offers its own inter-networking products, including the recently introduced Open Network System router.

But there is overlap between AT&T's Rhapsody groupware work flow automation product and NCR's Cooperation offerings, which are similar, observers said.

One area where there is no overlap is in front-end processors. The addition of NCR Comten's line of IBM-compatible front ends to AT&T's arsenal could give IBM more competition while providing AT&T with more access to the MIS shop, said Harvey Poppel, a partner at Broadview Associates, a Fort Lee, N.J., mergers and acquisitions firm.

"How better to get close to the mainframe than by being attached to it via a front-end processor," he said.

Because there is overlap between the two companies' products, observers said some blood-letting is inevitable. And it is most likely that AT&T will make a long-term commitment to NCR's computers and Open Cooperative Computing Architecture rather than to its existing lines. □

PacBell delivers PRI

continued from page 2

two standard and several optional features including a limited automatic number identification (ANI) capability and call-by-call service selection, which enables customers to configure PRI channels on an as-needed basis.

Intra-Service Caller ID, one of two standard features, provides the calling party's telephone number with intracompany calls, including calls from Centrex stations and other company locations that use PRI or are served by the same switch.

PRI IS' B-Channel Configuration feature enables customers to use channels on PRI access links more efficiently. With this feature, customers can reallocate bandwidth on a PRI line as calling needs change, rather than having to assign specific channels to specific services.

One optional feature broadens the availability of PRI IS. FX/Prefix Connection enables customers to use PRI service even if they are served by a central office unequipped to support PRI.

Pacific Bell will install a foreign exchange line between the customer's current serving office and the nearest PRI IS-equipped switch. This allows customers to use PRI IS without changing phone numbers. It carries a one-time \$250 installation charge

and a \$30 monthly charge.

Another feature, B-Channel Packet, a packet-switched data communications capability, requires Pacific Bell to nail up a 64K bit/sec B channel between the user site and the serving central office. B-Channel Packet carries a onetime \$280 charge and a \$350 monthly charge per B channel.

With Private Facility Connection, the carrier installs a backup T-1 line linking the customer's PRI site with an alternate access service provider, an inter-exchange carrier point of presence or a second user site with a non-ISDN private branch exchange. It has a \$250 onetime charge and an \$825 monthly fee.

Intra-Service Arrangement Calling Connection enables users to link ISDN PRI "islands." Pacific Bell will route PRI traffic through a series of central offices that are not equipped to support PRI to a PRI switch that can deliver the traffic to the customer site. The feature carries a onetime \$250 installation charge and a \$730 monthly charge per link.

Network Ring Again enables a caller receiving a busy signal to instruct the central office switch to place the call when the number dialed is free. This feature carries a onetime \$250 installation charge and a \$20 monthly charge per link. □

Users back AT&T acquisition of NCR

Network managers last week voiced approval of AT&T's proposed acquisition of NCR Corp., indicating that such a marriage would dispel doubts about AT&T's commitment to computers and create an open systems networking giant.

NCR customers said AT&T could bolster the Dayton, Ohio, computer maker's networking strategy, while AT&T users said the acquisition would make AT&T an attractive one-stop shopping center.

"My first reaction was curiosity and amazement," said Greg Lee, manager of customized network services at Chevron Corp., an AT&T Tariff 12 and network management services customer. "But I also see this as a signal that AT&T has become a different company — that the slumbering monopolistic giant is waking up and changing to meet changing user needs."

Norris Overton, vice-president of information systems at National Railroad Passenger Corp., said AT&T's aggressive action has "reaffirmed my belief that AT&T is in the computer business for the long haul." National Railroad recently signed a \$14 million contract for AT&T to install computers in the user's

reservation network, he added.

"AT&T's lack of market share was one of my concerns," Overton said. "I've been assured by AT&T management that AT&T's computer business is headed for the black, but adding NCR would make me feel even better."

Overton also said he likes the idea of one-stop shopping. By contracting for computers and networking services from the same vendor, finger pointing is cut down when a problem arises, he said.

Overseas presence

The acquisition of NCR also would give AT&T a much bigger computer presence overseas, Overton said, strengthening the company's ability to weather downturns in the U.S. economy.

"In my travels, it's been noticeable that NCR has offices all over the world," he said.

Harry Heintz, manager of communications services at The Circle K Corp., a retailer based in Phoenix, also reacted favorably to AT&T trying to take over NCR, noting that his company is on a migration path toward the open systems environment that both AT&T and NCR are pushing. Circle K is an AT&T Software-De-

fined Network customer and is considering using NCR devices in its stores, Heintz said.

"I was pleased to see AT&T doing something as far as getting some computer manufacturing capability moved under their wing besides the 3B processors," he said. "The work group stations and products they were previously putting out through the [Ing. C. Olivetti & Co., S.p.A.] relationship weren't really that great."

"I was glad to see they picked an American company to merge with," Heintz added. "It looks like a good fit. NCR's got a great reputation for hardware reliability and service capabilities, and that fits in with all the value-added services that AT&T likes to market right now."

Heintz said buying both services and computers from AT&T would be an attractive option.

"I think there is going to be a lot more computing available via network services in the future than a lot of people would like to think about right now," he said. "I would be very comfortable recommending that my company go to AT&T as a single-source supplier for both network and computing services."

— Bob Brown

NETWORK WORLD

161 Worcester Road
Framingham, Mass. 01701-9172
(508) 875-6400

Second-class postage paid at Framingham, Mass., and additional mailing offices. *Network World* (USPS 735-730) is published weekly, except for a single combined issue for the last week in December and the first week in January by Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-820-7444.

Non-qualified subscribers: \$3.00 a copy; U.S. — \$95 a year; Canada, Central & South America — \$110 a year; Europe — \$165 a year, all other countries — \$245 a year (air-mail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label appearing on front cover of the publication.

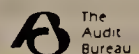
Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zebb Road, Ann Arbor, Mich. 48106.

Network World is distributed free of charge in the U.S. and Canada only to qualified management or professionals who specify and maintain communications equipment and systems, including voice, data and video, as well as to common carriers, consultants, systems houses and manufacturers of communications equipment.

PHOTOCOPY RIGHTS: Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Network World, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of \$3.00 per copy of the article, plus 50 cents per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, Mass. 01970.

POSTMASTER: Send Change of Address to *Network World*, 161 Worcester Road, Framingham, Mass. 01701-9172.

Copyright 1990 by Network World, Inc. All rights reserved. Reproduction of material appearing in *Network World* is forbidden without written permission.



Reprints (minimum 500 copies) and permission to reprint may be purchased from Donna Kirkey, Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

ALLIGATORS IN THE SWAMP

*Unforeseen problems that can
put the bite on your network*

The mail system snafu

One firm's quest to enable IBM users to send mail to DEC users.

We thought it would be easy. We only wanted to let our IBM users send mail to our Digital Equipment Corp. users. After all, the DEC users within our company were already accessing the IBM 3090 host across Systems Network Architecture gateways. It was simply a matter of reversing the pathways, right? That was our thinking when the furniture manufacturing company for which I had worked a few years ago made DEC's All-In-1 software environment its standard for electronic mail exchange. We chose All-In-1 because it had already been installed and had a large user base within our firm.

Simple goals

My project team's goal was simple: to provide users of IBM 3270 terminals with transparent access to the VAXcluster — specifically, to All-In-1. In addition, we had to complete the project by year end, which was less than 90 days away.

We figured that there were three potential protocol-converting packages: Anet from Case Communications, Inc., Interlink from Interlink Computer Sciences, Inc. and IBM's forthcoming ASCII support options for its 3174-type controllers.

We had to scratch Interlink right from the start because our technical support group would not support a channel-attached device not manufactured by IBM. A second drawback to Interlink was that its interface between the IBM and VAX was a small DEC PDP, which limited the number of active gateway users to 64. We had a design requirement to support more than 200 user sessions. Since IBM's ASCII support solution was still a few months from release, by default, we decided to beta-test Anet.

The Anet software, which is run under TSO, allows the end user to select a VAX session from a VTAM-level menu. A virtual connection is made via VTAM from the host through the 3725 front-end processor. A cable completes the link from the front-end processor to a card on a data switch. The data switch also has a card that allows it to interface with Ethernet. Finally, the data switch bridges the sessions between the IBM 3090 and the VAX, and provides the protocol conversion.

Unfortunately, after four weeks of preparing for live user beta testing, we realized the Anet solution wasn't going to work. First, Anet suffered slow response time because it was a TSO application running in a highly intensive CICS environment. In addition, because of the limitations of the data switch, it could support a data transfer rate of only 19.2K bit/sec.

However, the biggest problem was that cursor positions were apparently getting lost. The cursor would physically move whenever the end user hit the tab or arrow keys, but cursor location-sensitive applications did not read the correct cursor position relative to the screen.

After weeks of data scope analysis and the support of Case Communications' technical staff, we discovered that Anet acted like a 3270-type controller. A 3270 controller operates in block mode instead of character mode.

The difference is that the 3270 controller echoes all character and cursor positions to the terminal and does not pass them onto the host until a terminator key, such as a programmable function (PF) key or ENTER, is pressed. In contrast, the VAX ASCII terminal, when connected directly and not on a terminal server, echoes every character and cursor movement on each keystroke.

Because of the way the controller — or in this case, Anet — handles the block-mode transmission, the cursor positions are never passed on to the All-In-1 VAX application. Thus, there was no true way of doing a full-screen edit without hitting ENTER after each screen location update.

By this time, IBM's ASCII support product was only a week or so away from announcement. Telex Computer Products, Inc. already offered an ASCII support product; however, it would have required us to replace up to eight IBM

3174 local-attached controllers with Telex Computer Products' 274 and 1174 remote models. We opted to wait for delivery of the IBM ASCII support modules.

Because of shipment delay, software upgrades and other mysterious problems, the ASCII support modules arrived four months late. We installed the option on our 3174 controllers and prepared for beta testing.

The 3174 controllers were configured for multiple sessions per unit. The user could then toggle between an IBM host session or a VAX session. Twisted-pair cabling was used for the physical connections, and the port was linked via an eight-legged octopus cable to a 25-pair standard telephone cable. This cable terminated on a telephone company 66 block.

We chose Xyplex, Inc.'s Maxserver 5000 for our Ethernet terminal servers. This device supports 120 users on 15 eight-port cards in one chassis. The backplane of the card also had a 25-pair telephone company connection. We ran a cable from the back of each server card to the 66 block and completed the connections with standard cross-connect wire between the server block and the controller block.

We plugged in a terminal and fired up a test session. After testing a quick logon, we called in one of our VAX technical support people to test an All-In-1 session. However, when the user logged on to All-In-1, none of the function keys worked. A quick evaluation showed that the 3174 controller software signed on the terminal as a DEC VT-100 device. Our project required VT-220 emulation to support expanded PF key functionality and special screen formatting, such as reverse video. IBM had no plans to support VT-220, so we were forced to scrub the IBM ASCII solution.

Headed off at every pass

Our last recourse was to purchase the Telex 274 and 1174 controllers, which supported VT-220 and could run at remote, attached speeds of 56K bit/sec. Once again, we ran into problems. First, the 3725 front-end processor did not have the memory or hardware to support even one new 56K bit/sec line, let alone the three new ones we needed. We were adding eight new controllers and had engineered three to a line.

In addition, due to a software bug, the new controllers were not supplying control signals to the RS-232 ports. This was later fixed by a software revision from Telex. Next, the Data Terminal Ready lead on the controller would not drop when the session was terminated; therefore, users would not be automatically logged off when their sessions ended. This also required a software fix.

Finally, we were ready to train IBM users on how to access All-In-1. Two weeks into the training, the last alligator attacked. By sheer luck, every user who participated in the beta test used a 3180-type terminal device — 3180 terminals support reverse video, while 3178-type terminals do not. Approximately 100 or so 3180-type terminals would have to be purchased in order to replace the 3178- and 3278-type terminals to provide end users with reverse video support. Reverse video is important to some All-In-1 applications such as spell-checking and cut-and-paste functions.

By the third quarter of 1989, the 90-day project was finally complete — 180 days late. The project, originally budgeted for less than \$100,000, cost more than \$325,000. Meanwhile, during the final phases of the project, the vice-president to whom we reported resigned and our MIS director was moved to a new position. Six months after implementation, our chief executive officer, on recommendation of the new vice-president and MIS director, announced that we would phase out the VAXcluster by the end of 1990 in favor of an all-IBM platform. We had drained the swamp, but the alligators had the last laugh. ■

IT'S HARD TO DRAIN THE SWAMP when those reptiles keep getting in the way. To share your "alligator story," call Susan Collins, assistant features editor, at (508) 820-7413 or fax your idea to (508) 820-3467.



Sobish is a network analyst for Dow Corning Corp. in Midland, Mich.

By Jack Sobish



Doubt has an office. Anxiety has a key to the Ambition and a lunch date with Paranoia. And me, our PBX works as consistently as the tides. And just as who just happens to be passing by my office at this That ring is a chorus of thousands of AT&T workers was a peerless decision....” And as the phone rings residual value in the industry. It’s ready to grow like maintenance program unequaled....” But Blame looking for some other doorway to darken. Just as asking me if I had lunch plans.



*washroom. Insecurity has a stack of messages from
I'm staring at my telephone celebrating the fact that
I'm doing this my phone rings, and I say to Blame,
time, I say, "Blame, you know what that ring is?
reminding me that buying their **DEFINITY**® System
again I say, "Blame, this system has the highest
flowers in springtime and is supported by a
didn't hear this last part, as he was down the hall
well though, it was Advancement on the phone*

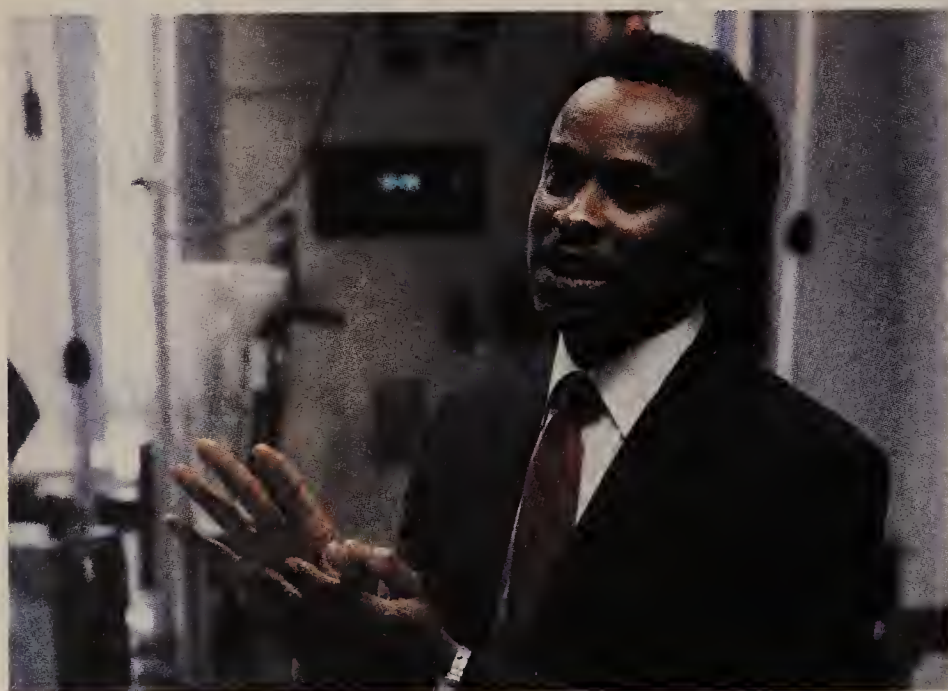


AT&T

The right choice.

"At St. Jude, we're caring for children with cancer. We need a network that can care for itself."

"Only BANYAN could have done it."



From an interview with Albert Herrington,
St. Jude Children's Research Hospital.

"We don't want a big network administration staff. We're a research hospital dedicated to catastrophic childhood diseases, and that's where the money goes."

What problems did you face?

"The worst problem was the conglomeration of hardware to be tied together. Everything from PC ATs to DEC VAXs and an IBM AS/400. That, and continuous moves as we remodel and expand the facilities."

Whose network operating software did you evaluate?

"Everyone's, it seems. IBM's, AT&T's, Novell's, Banyan's and 3Com's."

How does St. Jude feel about choosing Banyan's VINES® now?

"We're extremely pleased. VINES' StreetTalk® feature has made moving people easier because you can reach them anywhere, anytime on the network without having to know their specific server. And since VINES is so reliable, we can concentrate more time on application development and helping our users take full advantage of the network."

Banyan's VINES network operating software can make organizations of all sizes more productive, while minimizing operating costs. For a further description of St. Jude's networking problems and real-life solutions, write or call us at 800-828-2404 (in MA 508-836-2828).



BANYAN®

Networking. Without limits.